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WATER USE CRITERIA FOR BOATING A CASE STUDY OF WATER- LAND USE CONFLICTS IN GALILEE, RHODE ISLAND

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WATER USE CRITERIA FOR BOATING
A CASE STUDY OF WATER-LAND USE CONFLICTS
IN GALILEE, RHODE ISLAND

by

WILLIAM ROBERT ONOSKO

A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE
REQUIREMENTS FOR THE DEGREE OF
MASTER OF COMMUNITY PLANNING

UNIVERSITY OF RHODE ISLAND

1968

MASTER OF SCIENCE THESIS

OF

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UNIVERSITY OF RHODE ISLAND

1968

ABSTRACT

The area of contact between land and water often results in land use conflict, especially between commercial users of land adjacent to recreational users of water, causing disorders of various types. Much inconvenience results in terms of efficiency for commercial and recreational users. Physical criteria were established and found applicable to promote maximum efficient utilization of water areas in terms of boat maneuvering and berthing, waterfront safety, and to aid in predicting desirability of land use development.

A counterpart to this thesis, A Study of Land Resources Used For Boating in Galilee, Rhode Island, has been written by Mr. Donald Sikorski (a classmate). This study, when applied in conjunction with criteria developed in this volume, will reduce conflicts existing between land and water by promoting sound land development methods in relation to efficient water resource use.

Research was conducted at the library of the University of Rhode Island and the Graduate School of Design at Harvard University. Letters of inquiry were sent to agencies in the United States concerned with water resource development and recreational boating. Interviews were conducted with personnel of the Rhode Island Department of Natural Resources,

in Galilee, Rhode Island.

The case study method was used to illustrate a typical situation, and the area, Galilee, Rhode Island, was selected because of its appropriateness and propinquity. Problems of maneuvering, control, safety, convenience and protection are discussed and suggestions made to correct them and similar problems elsewhere. For example, in Galilee the space between piers is inadequate to allow boats to leave their mooring until the boats behind them are first removed. This condition is inconvenient and a definite fire hazard. The criterion to avoid such a condition is, "In planning berthing areas, such as slips for boats of all types, clearances between opposite slips should be beyond the beam (width) and length of the boats."

It was determined that water resource development in Galilee, Rhode Island occurred in an irrational manner, resulting in conflicts among both water and land users. Facilities were provided without regard to boat size or type and adjacent land use. Water space allocation was not determined by water use, and typical results were inefficient water use and fire hazards.

Fifteen physical criteria were established and analyzed. For example, "Water resource planning should include zoning of these water areas with respect to function such as commercial or recreational boating;" and "In planning water resource areas for boat facilities the water area should be complemented by at least as much land (preferably

level and undeveloped)." When applied, these criteria will result in proper water resource planning and in maximum potential utilization of water areas and safety and convenience to water users.

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INTRODUCTION

Statement of the Problem

The zone of contact between land and water offers many areas of study in which complex problems arise. This thesis gives particular attention to boating needs. The problem results from the fact that there are many types of boats and an increasing demand for recreational boating and facilities, and that this demand has resulted in conflicts in waterfront planning. Therefore, the purpose of this thesis is to demonstrate by using Galilee, Rhode Island as the study area that demand and conflicts exist and that criteria can be developed, which if applied, would reduce these conflicts.

Justification of the Problem

The problem is selected for its timeliness and importance to waterfront planning where water-land relationships have been unplanned or haphazardly arranged. Incompatible uses and facilities, and increasing demands for shoreline boating have resulted, in many instances, in inefficient waterfront development. Therefore, it is necessary to establish criteria which will reduce the conflicts of the water-land relationship for boating. To achieve this goal the problem area, Galilee, Rhode Island,

serves as an excellent study area because of the marine-land problems which are an outgrowth of haphazard development in mixed land-water uses.

The primary limitations of this study were a lack of available boating statistics. State officials have said they are in the process of gathering such data and it will be available in the future. The needs in this case were the number, type and size of boats using Galilee, Rhode Island during the summer boating season. Also the writer found material on water resource planning somewhat limited.

Present Status of the Problem

There have been few contributors to the problem investigated. The National Association of Engine and Boat Manufacturers, the Outboard Boating Club of America, the American Society of Civil Engineers, and the United States Army Corps of Engineers are the primary contributors to water resource planning. Very little data has been developed by the planning profession, as emphasis is mainly on land use planning.

Organization of the Thesis

The arrangement of the thesis follows. Chapter II, "Inventory of the Problem Area," explains the location and boundaries of the study area; land ownership; existing water and shoreline use analysis; utilities and facilities surveys; and circulation and accessibility.

Chapter III, "Marine Resources Criteria," covers existing facilities inventoried for boating; water area used for boating; necessary

marine facilities required for boating; specific marine problems related to boating; and criteria for efficient marine uses involving the type of boating facilities, extent of boating facilities, arrangement of boating facilities, and water-area requirements.

Chapter IV, "Land Resource Criteria," is a summary of the land resource criteria established in the counterpart to this thesis entitled "A Study of Land Resources Used for Boating in Galilee, Rhode Island."

Chapter V, "Application of Criteria to Galilee, Rhode Island," applies the criteria developed in Chapter III and includes schematic designs of recommended water and land use.

Chapter VI is an overall conclusion and summary of the thesis.

Sources of Data and Method of Procedure

Two hundred six letters of inquiry were sent to agencies and individuals primarily in the United States connected with boating and water resources for information related to this thesis. A list of respondents to these letters of inquiry is appended.

Extensive library research was carried out at the University of Rhode Island and Harvard University. Additional material was received from other libraries through the University of Rhode Island inter-library loan program.

Interviews were conducted with both commercial and sports fishermen, merchants in the Galilee area, Rhode Island Department

of Natural Resources personnel and property owners in the vicinity of Galilee, Rhode Island. Observations were made of marinas and boat launching areas. A forty minute color film entitled "Marinas" produced by the National Association of Boat and Engine Manufacturers was also obtained.

The case study method was used because it describes an existing situation--the water resource problems in Galilee, Rhode Island. These problems are defined and suggestions are made that will enable the planner to correct them and similar problems elsewhere.

II

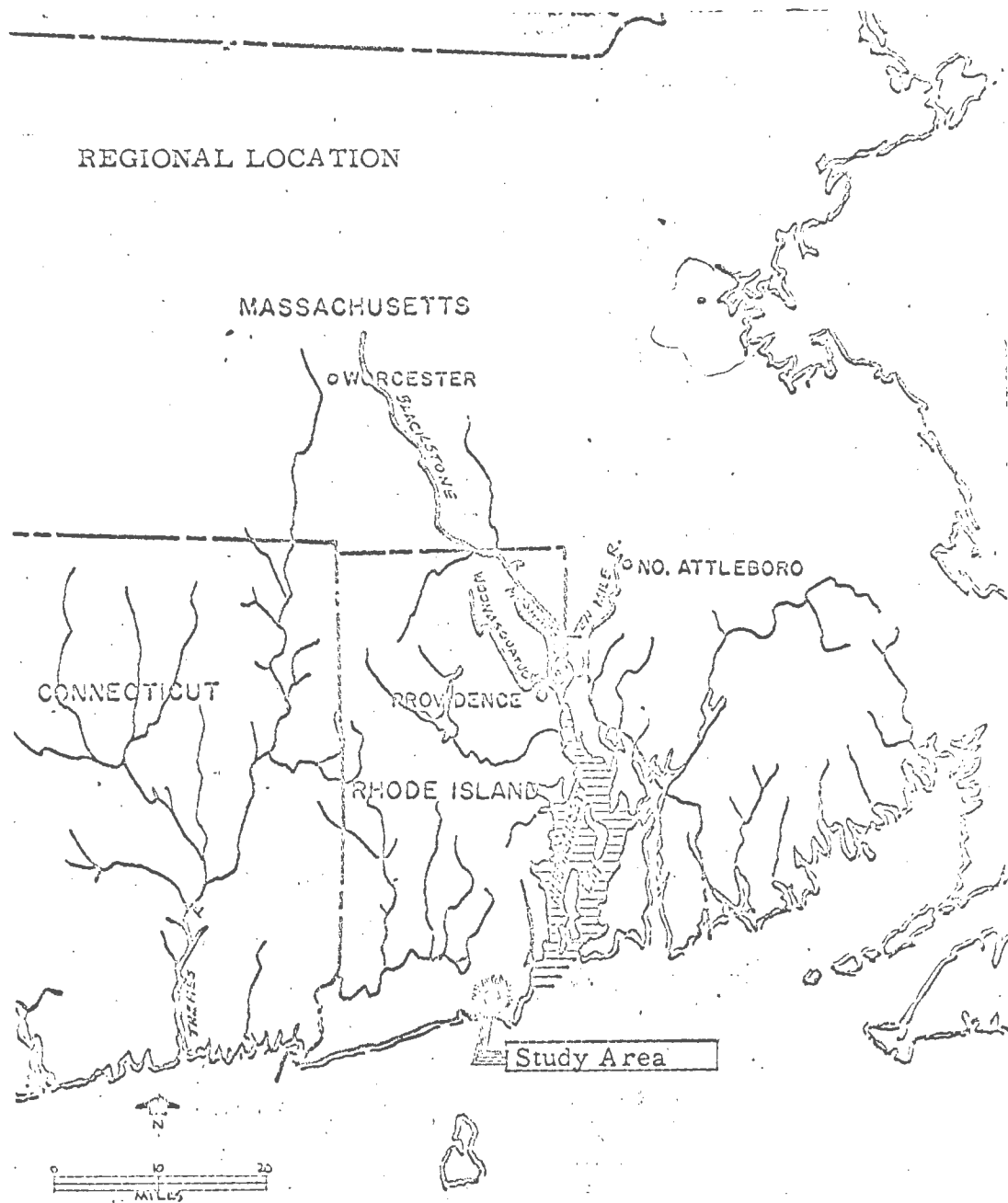
INVENTORY OF THE PROBLEM AREA

This chapter is an inventory of the problem area and will include location and boundaries of the study area, land ownership, existing water and shoreline use analysis, a utilities and facilities survey, and circulation. Maps illustrating the location and boundaries of the study area, land ownership, existing water and shoreline uses and circulation are included.

Location and Boundaries of the Study Area

Galilee, Rhode Island is a small commercial fishing port located in the town of Narragansett. The area is on the Rhode Island sea coast and is about forty miles south of Providence.

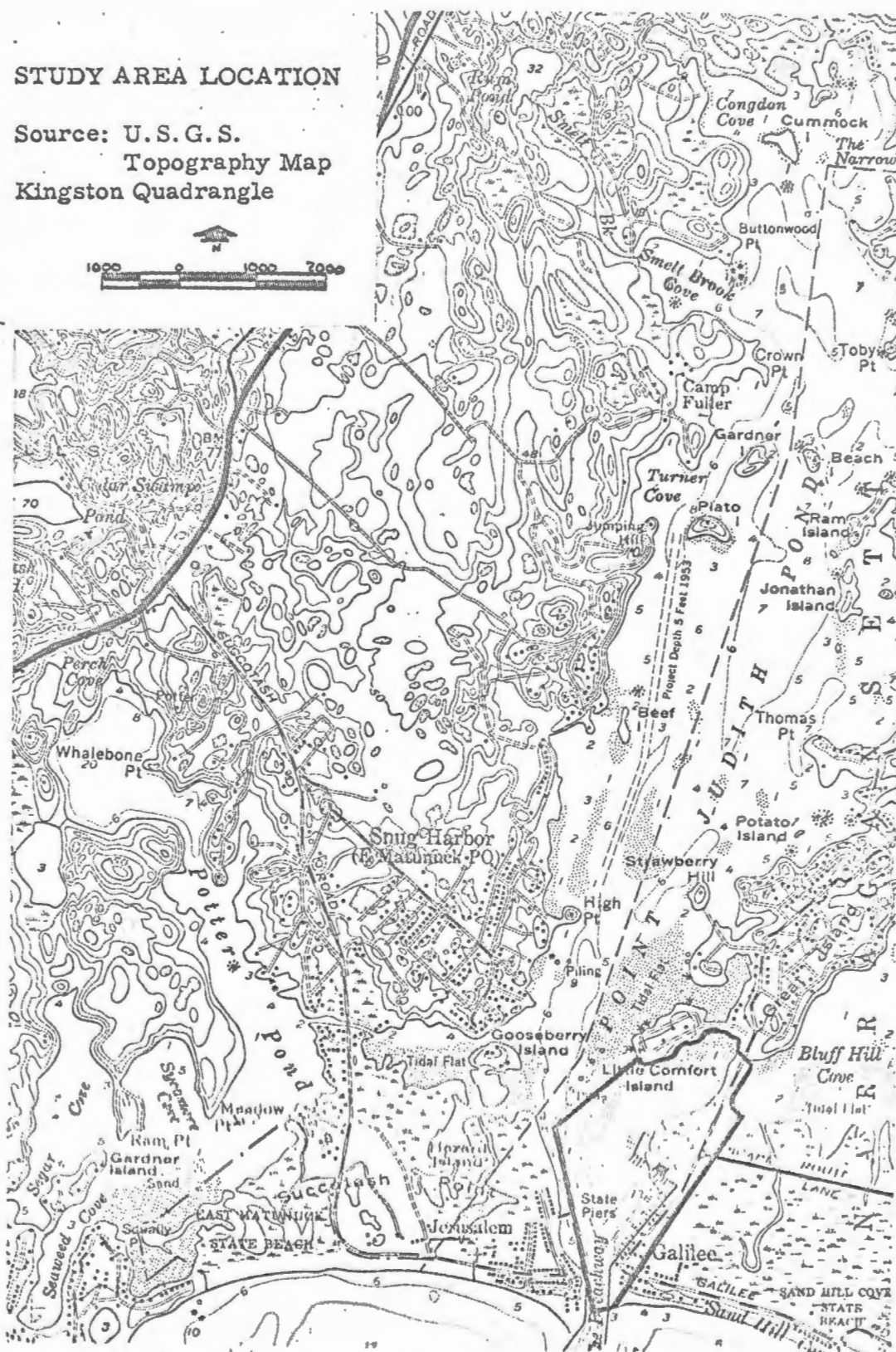
The Galilee area is served by a network of excellent hard-surfaced roads and U.S. -1, a limited access highway, which passes approximately four miles to the north of Galilee and provides good access from the heavily populated areas of Rhode Island, Connecticut, Massachusetts, and New York. The main line of the New York, New Haven and Hartford Railroad passes through the village of West Kingston about seven miles to the northwest of Galilee. A branch line for freight only serves the village of Wakefield, which is about four miles to the north of



Source: Naninni Giulio Martucci, Coastline and Oceanographic Zoning: Use of Marine Resources and Hydrospace (Master of Community Planning Thesis, 1967.)

STUDY AREA LOCATION

Source: U. S. G. S.
Topography Map
Kingston Quadrangle



Study Area Boundary

Galilee. A mail, passenger and freight ferryboat service to Block Island has its terminus at the State Pier in Galilee. A bus line operates between Galilee and Providence. Commercial air transportation is available at the Theodore Francis Green Airport at Warwick, thirty-two miles distant.¹

The Galilee study area is in the town of Narragansett, Rhode Island and is at the southerly end of Point Judith Pond, is bordered on the north by Great Island, the east by Bluff Hill Cove and the Galilee Bird Sanctuary, the south by the Atlantic Ocean, and the west by the village of Jerusalem in the town of South Kingstown.

The Galilee water area is entered through a breachway from the Harbor of Refuge which extends outward into the Atlantic Ocean. The Harbor of Refuge and the Galilee water area provide a safe and spacious area for boat docking and anchorage of commercial and pleasure craft.

At present the area includes facilities for commercial fishing vessels, the Block Island Ferry service, large party boats for deep sea fishing, charter boats for sport fishing, privately owned pleasure boats, a fish processing plant of the Fisherman's Cooperative and a

¹United States Congress, House, Committee on Public Works, Point Judith, Rhode Island, 87th Congress, Second Session, House Document No. 521, 1962 (Washington: Government Printing Office), p. 21.

fish meal plant. There are a number of small restaurants and shops in the village of Galilee, as well as a small congested residential area.²

Land Ownership

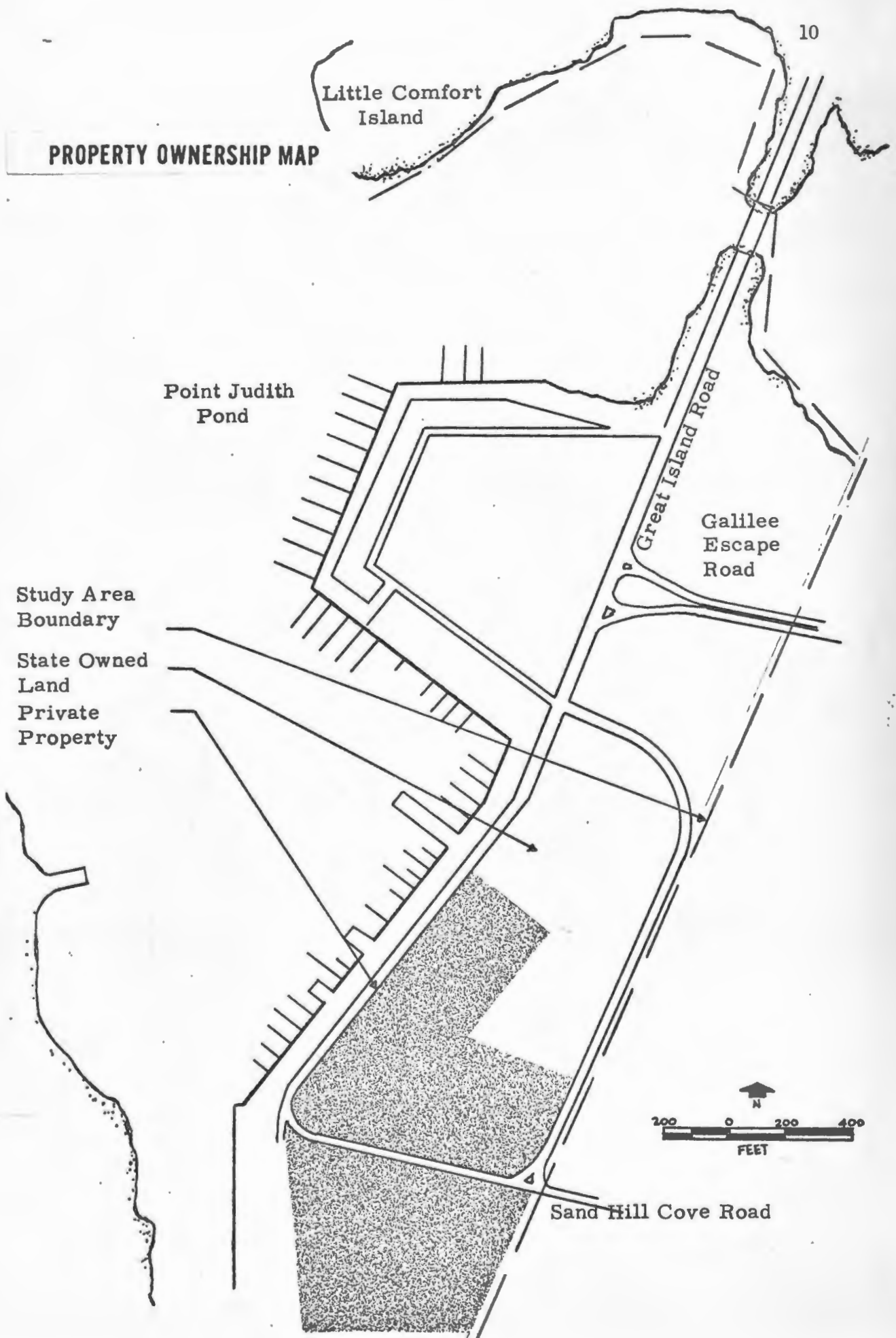
Most of the land in Galilee is state owned, as indicated in the map on page 10, which puts Galilee under the control of the State of Rhode Island, Division of Harbors and Rivers. The state government, because of a lack of funds, has been unable to finance the needs in Galilee. One alternative suggested by fishermen is to establish a Port Commission which will have the authority to issue revenue bonds backed by the state to finance development in Galilee. It is understandable that persons living many miles from Galilee unaware of its problems are somewhat hesitant to have their elected representatives vote funds for Galilee when financial needs are so great throughout all of Rhode Island.

Existing Water and Shoreline Uses








Within the study area lies a diversity of land uses. Residential uses tend to be congregative on a small, congested, privately owned parcel of land in the southern portion of Galilee. The commercial uses are scattered throughout the area in both inland and waterfront locations.

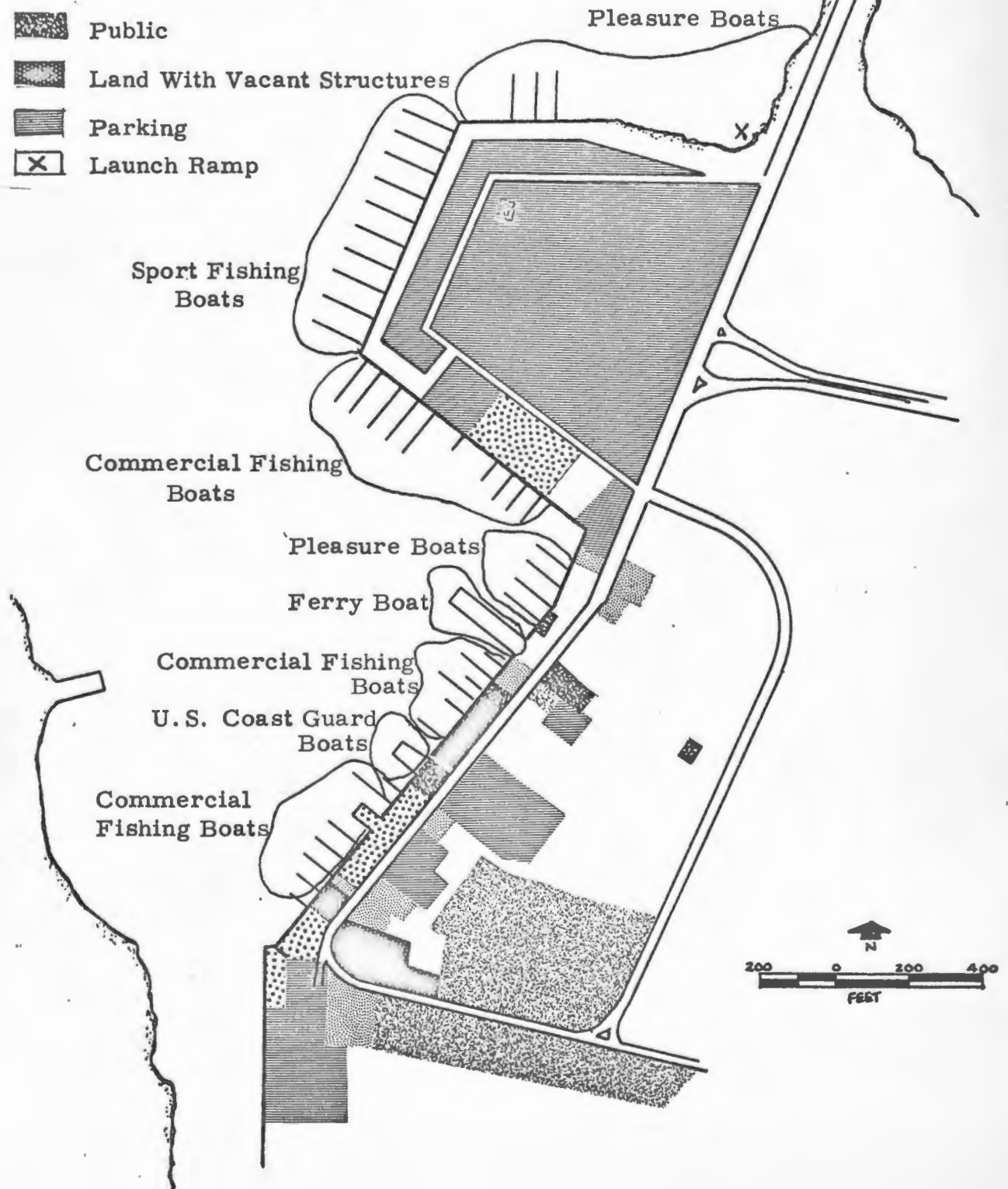
²United States Department of Commerce, Economic Development Administration, A Survey To Determine The Feasibility of a Port Authority for the Point Judith-Galilee Area of Rhode Island (New York: Development Counsellors International, Ltd., 1965), p. 1.

PROPERTY OWNERSHIP MAP



EXISTING LAND AND WATER USE

-  Residential
-  Commercial
-  Industrial - Storage
-  Public
-  Land With Vacant Structures
-  Parking
-  Launch Ramp



Manufacturing is limited to the commercial fishing operations and the machine shop which occupy waterfront land.

The land uses fall into five categories--residential, commercial, industrial, parks and recreation, and vacant land. Residential uses consist of year round and summer homes. Commercial uses include retail and service business. Industrial uses include manufacturing and warehousing. Parks and recreation uses include state and government owned facilities.

The boating facilities on the Galilee water area are state owned and leased to the commercial fishermen and pleasure boaters. Also, the state controls and maintains State Pier No. 3 which is used as the launcher for the Block Island Ferry. The docking areas fall into five categories which are used for the Block Island Ferry, United States Coast Guard, commercial fishing, charter fishing, and pleasure boating.

Utilities

Galilee is served by electricity obtained from the Narragansett Electric Company and a public water system provided by the town of Narragansett. There are no public sewer lines to serve the area, making it necessary to install individual septic tanks. A volunteer fire station is located in Galilee to serve both land and water needs.

Circulation

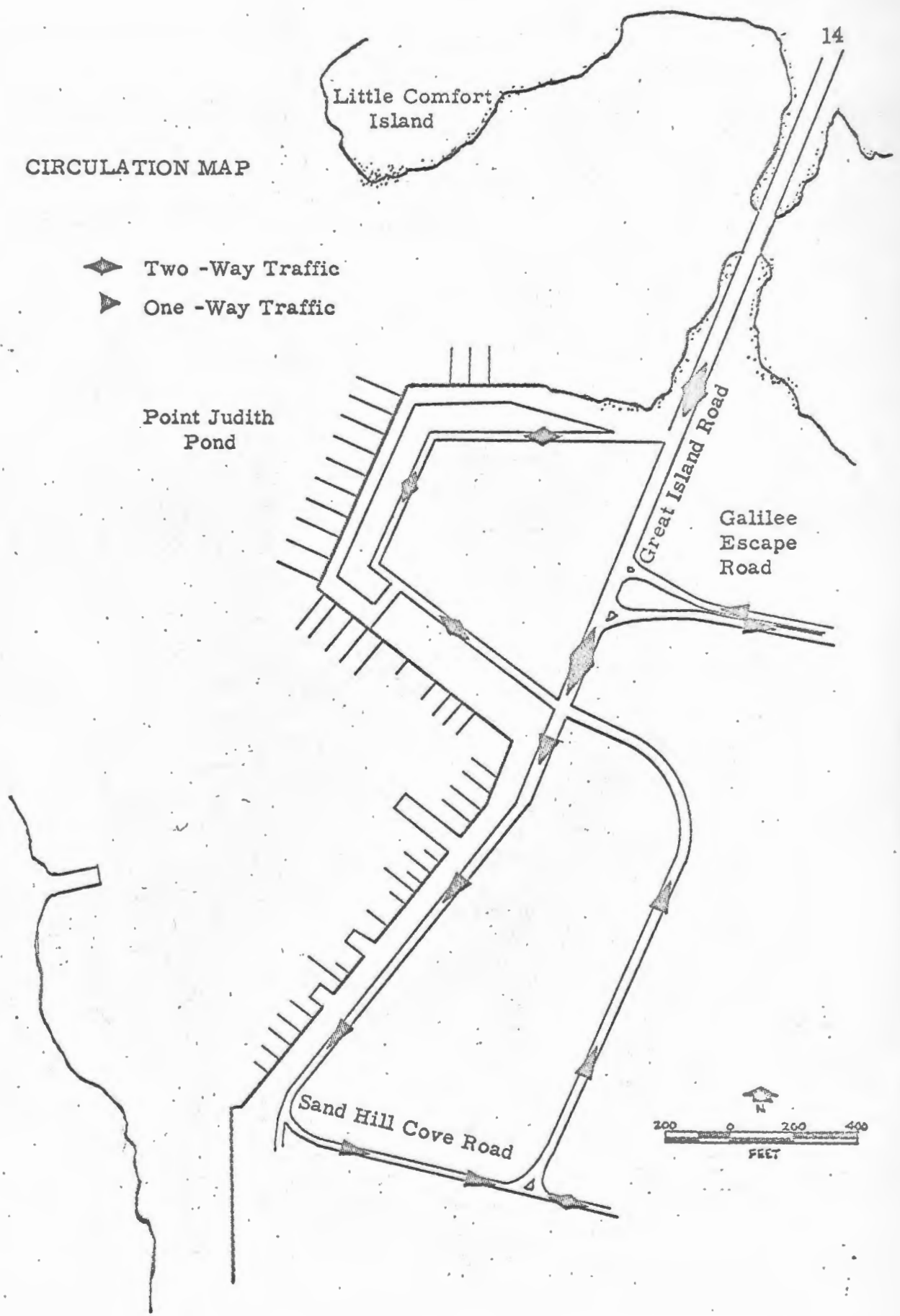
Galilee has recently updated its road system and improved the circulation pattern. The main waterfront street has been widened to meet approved standards. Sidewalks and curbing have been installed on approximately one half of the road. In addition a new right of way has been obtained and a new road constructed east of the existing waterfront street for purposes of easier access and efficient circulation. Traffic on the main waterfront street is one way in a southerly direction to a point where it exits the study area on Sand Hill Cove Road or proceeds in a one way northerly direction back to the main waterfront street. Another entrance and exit to the study area is provided by the Galilee Escape Road.

Population to be Served

In order to give Galilee some degree of scale the writer has attempted to arrive at a population figure which would be served by the study area. Statistics to arrive at such a population figure are not readily available requiring some degree of estimation. Therefore, the following estimate was used to arrive at population served in Galilee on an optimum day.

CIRCULATION MAP

- ◆ Two -Way Traffic
- ▶ One -Way Traffic



- 150 Persons Employed in Fish Processing Plant³
- 102 Commercial Fishermen⁴
- 18 Lobstermen⁵
- 400 Person Capacity for Party and Charter Boats⁶
- 400 Average Daily Visits to Block Island⁷
- 240 Persons Generated by Two Boat Launching Ramps⁸
(This results from three persons per boat and
forty boats for each two ramps.)
- 2,500 Tourists on Average Summer Day⁹
(300,000 visit Narragansett, Rhode Island on a
summer day; 300,000 visitors divided by 120 days.)
- 3,810 Total People Served on an Average Day

³ Ibid., p. 22.

⁴ Ibid.

⁵ Peter Sprague, Commercial Fisherman, Point Judith, Rhode Island, Interview, April, 1968.

⁶ Rhode Island Development Council, Boating In Rhode Island (Rhode Island: Rhode Island Development Council), pp. 17-18.

⁷ John Fish, Employee, Fish's Bait Shop, Point Judith, Rhode Island, Interview, April, 1968

⁸ Ibid.

⁹ Lewis A. Alexander, Narragansett Bay: A Marine Profile (Geography Branch, Office of Naval Research, June 1966), p. 65.

III

MARINE RESOURCE CRITERIA

This chapter is devoted to marine resource criteria. The points to be covered are the existing facilities inventoried for boating; adequacy of these facilities; water area used for boating; necessary marine facilities required for boating; specific marine problems related to boating; and the criteria for efficient marine uses involving the type of boating facilities, size of boating facilities, arrangement of boating facilities, and water-area requirements.

Existing Boating Facilities Inventoried

The Galilee water area is entered by a breachway from the Harbor of Refuge which extends outward into the Atlantic Ocean via stone jetties which guard the harbor and are marked by navigational and warning lights. This fine natural harbor and the adjacent Harbor of Refuge provide a safe docking and anchorage facility for commercial vessels and pleasure craft.

At present the area includes limited state-owned facilities for commercial fishing vessels, the Block Island Ferry service, large party boats for sport fishing, charter boats for deep sea sport fishing and privately owned docks. Docking facilities consist of fixed docks--

that is they are stationary and do not float up and down with the tides-- water, lights, and electricity. A small boat launching facility is located to the northeast of the trash fish plant, and a fuel facility is located next to the ferry landing. A map on page 11 shows the location of these facilities.

The Block Island Ferry landing in Galilee consists of one main pier as shown on the map on page 11. This pier is used for commercial and pleasure boats as well as the ferry. Dock space is somewhat limited and often causes traffic congestion as cars extend on to Great Island Road while waiting to board the ferry.

Adequacy of Facilities

The commercial fishermen are concerned over growing competition from recreational boaters for port facilities. Investments in new machinery for the cooperative fish meal plant are currently being considered. The commercial fishermen are understandably concerned over protecting that investment and being assured of room for future expansion. Also, to some degree, they see the prospect of additional tourism facilities in the area as a source of future complaints and a possible attempt to squeeze the commercial fishing industry out of the picture.¹⁰

¹⁰United States Department of Commerce, Economic Development Administration, op.cit., p. 2.

The charter boat group complains about the location of the slips assigned to them on Galilee waterfront, contending that the assignment made by the harbor master of berths for pleasure craft along the main street of Galilee, adjacent to the state pier and commercial fishing fleet, is unnecessary. Reports were received of instances in which private yacht owners sought to tie up at commercial fishing piers and were rebuffed by the fishermen because of the latter's fear that their heavier craft might damage the yachts with resulting litigation.¹¹

The facilities at Galilee have several shortcomings. Primarily they are improperly maintained. Although water lines are available on the docks, the water is turned on only during the summer when the Tuna Tournaments, which last only for a few weeks, are using the port. Present difficulties also include inadequate water pressure and safeguards to protect the lines from freezing.

Problems have been encountered with lights on the docks. Residents in the area have complained that there is too much light at night, while boat captains complained that improper type lighting blinded them as they approached the docks. This has been improved upon to some degree by installing new lights.

Docks have some major drawbacks in that they are not adequately spaced. In some cases two boats moored at separate docks do not

¹¹Ibid., p. 3.

leave sufficient water space for a third boat to pass. As can be seen in Figure I, boat A or B would be unable to leave the berthing area unless either boat C or D were first removed. A standard boat width is not used, and the writer uses the dimension only to illustrate the particular problem.

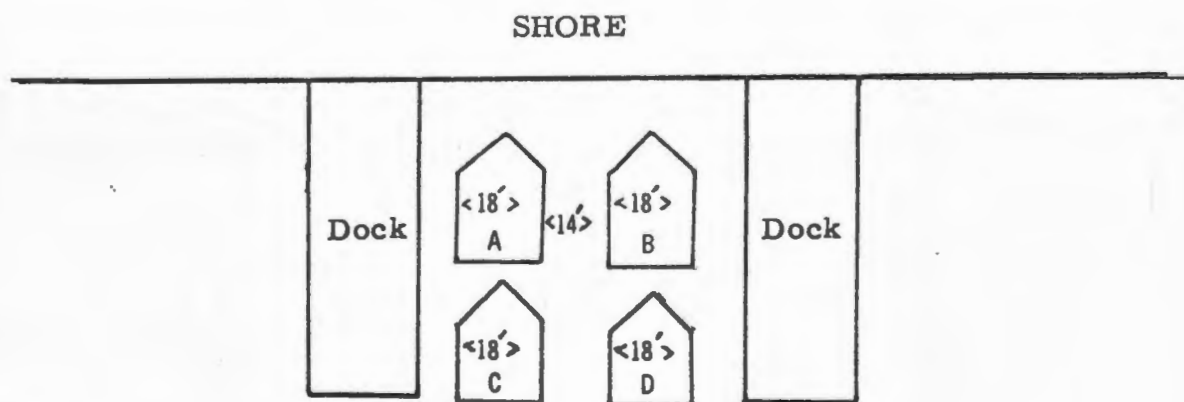


FIGURE I
INADEQUATE SPACE BETWEEN DOCKS

For over ten years the fishermen have requested more space between docks, but these requests have been denied by the state due to a lack of funds. In addition some docks are too narrow to allow a pick-up truck or other such type vehicle to service the commercial fleet.

There are no marine railways in Galilee itself, but this facility does exist on the opposite shore in Jerusalem, Rhode Island. It is not absolutely necessary for such a facility to be located at Galilee as long as there are others in the near area. At present the facilities in Jerusalem are sufficient and are only used when boats need repairs or painting.

Breakwaters or baffles to protect small craft from natural waves or large boat wakes do not exist within the Galilee water area. This is probably due to the fact that a small boat area is really not developed. For all practical purposes, one could say such an area does not exist. A body of water for small craft does exist, but because no proper facilities are in the area, the writer cannot define it as an accepted small craft area, but only as an unutilized area.

One can purchase fuel in Galilee, but first he has to find it. Existing fuel facilities do not have easy accessibility, are not located at the end of a pier, and would require the patron to seek out the seller at the J. L. Shellfish Company next to the ferry landing, where the only facility is located.

Galilee is well served by federal, state and local patrol units--namely the United States Coast Guard, police boats from Narragansett and South Kingstown, and at times a Department of Natural Resources boat.

Further poor planning is obvious in that all docks are of the same size and design without regard to boat size and type.

The present steel bulkhead system built in 1933, a wall between land and water, is badly corroded and is deteriorating at a rapid pace. Huge holes have developed in the bulkhead resulting in loss of fill material and creating large depressions behind it. Hazards to life as well as to property are ever present while the bulkhead remains in its present extremely poor condition.¹² Furthermore, when dock and bulkhead repairs are needed it sometimes takes three to five years to appropriate funds.

The small boat launching ramp area at Galilee, which is no more than a designated area, is only recognized due to a sign in the area. It lacks tie up facilities, is unsightly, and offers little to the recreational boater that are indicated as necessary on page 29 of this chapter.

Floating walks and piers, more commonly called "floats" are nonexistent in Galilee except at Ed Fish's Boat Livery. This type of facility is particularly necessary for recreational boaters who are unable to use the large fixed piers due to their height above water. An older person would probably find it impossible to tie to existing piers with a small pleasure craft.

¹²Henry Ise, Chief, Division of Harbors and Rivers, Statement at Public Hearing held at State House, December 4, 1963, Item No. 45, p. 1.

No facilities exist to remove sewage from boats at Galilee. The need for such facilities is becoming particularly urgent as the number of craft using the Galilee area continues to increase.

As can be seen, Galilee is deficient in many facilities. This neglect of one of Rhode Island's natural resources necessitates urgent action by the state of Rhode Island and the local municipality.

Water Area Used for Boating

As commercial and pleasure boats gradually increased in number, size and importance, so the need for more spacious accommodation became more pressing and the demand for larger and better harbors more imperative.¹³ Such a need for accommodations applies to Galilee, Rhode Island as well as the nation as a whole.

Water resource areas such as Galilee should fulfill the following four main requirements:

- (1) Provide a tract of tranquil water for protection against wind and waves
- (2) Permit quick dispatch of the commercial fleet
- (3) Allow the commercial fleet an opportunity to handle their catch at minimum cost with expedient methods
- (4) Adapt to the development of both commercial and recreational demands¹⁴

¹³Chao Hwa, Chu Teng-Kao, and Hsu Zan-Ziang, Study of Harbor Design (Mississippi: War Department, Corps of Engineers, United States Waterways Experiment Station, July, 1945), p. 1.

¹⁴Ibid., p. 4.

A water resource area such as Galilee if properly planned will attract many users; unplanned it cannot operate efficiently and benefits that could be available to the commercial and pleasure fleet will not be realized. In addition to providing for permanent users, the area should be available to the transient boater whether he be commercial or recreational. An understanding of boating capacities for the present and future of the Galilee water area are necessary in providing facilities.

In order to determine harbor capacity the swing area of each vessel must be known. The swing area can be roughly calculated by the area swept by a certain amount of radius. Usually the radius equals the length of the boat plus the mooring line attached to it, and an additional ten feet for tide changes.¹⁵ This method of determining capacity would not particularly apply in Galilee as most boats are berthed at docks rather than at anchor. In addition such methods of mooring boats result in inefficient utilization of space. In areas where space is scarce boats may be tied between poles as shown below. The disadvantage is boats are not adjacent to piers.

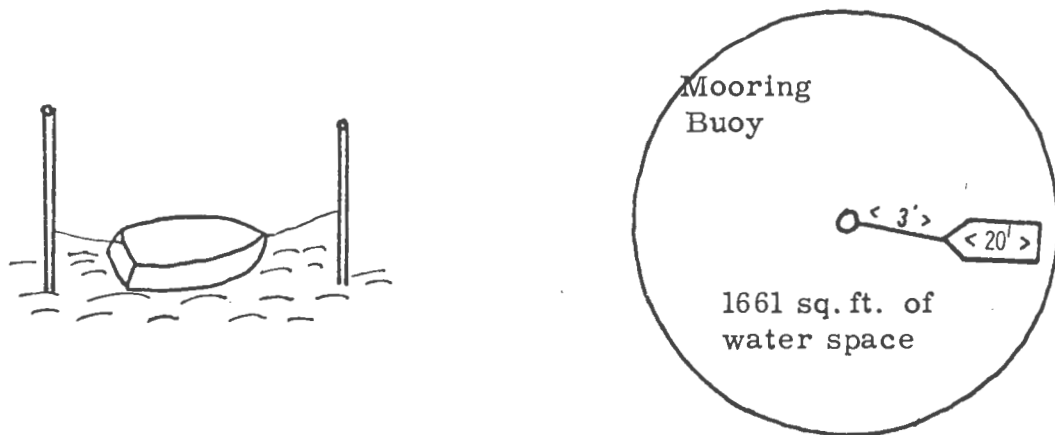


FIGURE II
METHOD OF DETERMINING HARBOR CAPACITY

¹⁵ Ibid., p. 6.

This method illustrates that a 20 foot boat with a 3 foot mooring line would require 1661 square feet of mooring space using the formula $A = \pi r^2$. Such means of utilizing water space is inefficient. Table I indicates that a 20 foot boat could be accommodated in 835 square feet of water if moored in a slip. This would include slip spaces, piers, catwalks, and suitable maneuvering area between piers. It is evident that the latter method is a great deal more efficient requiring half the space to moor the same size boat.

TABLE I
WATER AREA REQUIRED FOR SLIP MOORING

Boat Length	Square Foot of Water Required Per Boat	Water Acreage Required for 50 Slip Marina	Water Acreage Required for 150 Slip Marina	Water Acreage Required for 300 Slip Marina
20-25	835	.96	2.88	5.76
25-30	970	1.11	3.33	6.66
30-35	1270	1.47	4.41	8.82
35-40	1505	1.72	5.16	10.32
40-45	1775	2.08	6.24	12.48

NOTE: This Table established by the Wisconsin Department of Resource Development includes water area required for slip spaces, piers, catwalks, and suitable maneuvering area between piers.

Table II illustrates the size of boats registered in Rhode Island as of December 31, 1960 and the per cent of each size group. Such data give the planner an estimate of the type of facilities needed for pleasure craft in Rhode Island. While such data are not available for Galilee, Rhode Island, the writer feels that boat types and sizes found in Galilee are similar to those found elsewhere in the state.

TABLE II
SIZE OF BOATS REGISTERED IN RHODE ISLAND

Under 16 Feet	16 Feet to Less Than 26 Feet	26 Feet to Less Than 40 Feet	40 Feet to 65 Feet	Over 65 Feet	
10063	7437	1422	142	5	TOTAL
52.77	39	7.45	.74	.02	PER CENT

Necessary Marine Facilities Required for Boating

Commercial and recreational craft have similar needs, particularly a place to dock. The type and extent of facilities required depends upon the type, size and number of boats in the area.

Pier and Walk Structures. The designation "pier" is usually applied to any solidly built structure extending channelward over the

water for the purpose of supporting buildings or other heavy facilities and equipment; serving as work spaces, or providing access to the boats berthed in a particular water area. Piers, together with catwalks and anchor piles, serve as the principal means of securing the boats when berthed. The word "walk" is also frequently used synonymously with "pier" to indicate a structure used for access to the berthed boats. The word "catwalk" as used herein means a branch or spur extending transversely from the main walk or pier. A boat tied to the catwalk enables the boat owner greater ease in boarding.¹⁶ Figure III shows a typical pier and walk structure.

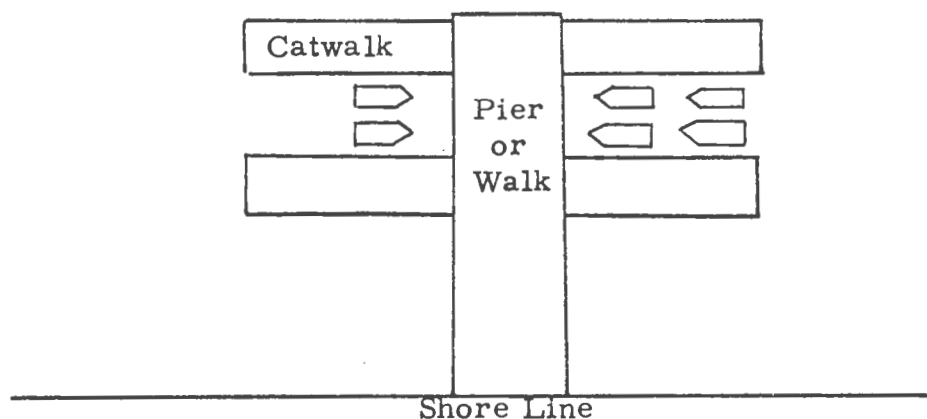


FIGURE III

PIER AND WALK STRUCTURE

¹⁶ Charles A. Chaney, Marinas--Recommendations For Design, Construction and Maintenance (New York: National Association of Engine and Boat Manufacturers, Inc., 1961), p. 120.

Marine piers or walks should be of the size and shape necessary to meet load and space requirements for safe walking and handling of supplies. Also the load capacity and type of construction must conform to local codes and laws.¹⁷ The many marinas now in operation in the United States generally conform to the Construction Codes of their local communities.¹⁸

Floating Equipment. The use of floating equipment under the name of floats, floating walks or floating piers is widespread in water resource development. The extent of such use is largely dependent upon two major factors; namely, the desire to provide safety and convenience to boat owners and their boats, and to provide piers and walks in locations in which fixed types of piers and walks would be unsatisfactory in use or impracticable in construction.¹⁹

Marine Railways. The marine railway is a mechanical device for launching and hauling boats. It consists of a track built to an appropriate grade, ascending from a point near the dredged bottom of a water area sufficiently low to accommodate the maximum draft to be hauled to a

¹⁷ Ibid.

¹⁸ H. A. Bruno and Associates, Marina Operations and Service (New York: National Association of Engine and Boat Manufacturers, Inc., 1967), p. 24.

¹⁹ Chaney, op.cit., p. 132.

high point where dry repair or transfer operations can be conducted. The railway is equipped with a cradle or car on wheels operated by a cable from an engine or motor located near the upper end.²⁰

Marine railways are as necessary to boats as parking and service areas for automobiles. In time of hurricanes a properly located railway can remove a boat from water to the safety of land. On the other hand, in the case of a land fire, dry docked boats can be placed in the water for protection. Marine railways are particularly necessary in an area such as Galilee, for the commercial fishing fleet frequently requires repairs that can only be accommodated by such a facility.

The limited depths in the Galilee water area, which is a part of Point Judith Pond, plus the increase in size of the average commercial fishing vessel has kept the boatyards on Point Judith Pond from increasing their marine railways to handle the larger craft. These larger craft are forced to go to Jamestown, Newport, Wickford, and Stonington to be handled and serviced.²¹

²⁰Ibid., p. 147.

²¹South Kingstown Waterfront Resources Committee, Point Judith Harbor--Proposed Navigation Improvements and Hurricane Protection (Rhode Island: South Kingstown Waterfront Resources Committee, 1968), p. 16.

Launching Ramps. The construction of launching ramps aids in eliminating the indiscriminate launching of pleasure boats from adjacent highways.²²

Launching ramps are primarily access sites where recreational boaters can place their trailered boats in the water. Adequacy of launching ramps can become very critical in times of a storm. In such a case inadequacy would find many recreational boaters waiting in rain and possibly rough water to remove their craft.

All launching ramps should be located in such a manner that once the boat is in the water facilities such as fueling, tackle, bait, etcetera should be conveniently located so that the boat operator can proceed from the launching ramp to the dock where he may tie up for a short period of time and pick up his basic supplies. The basic facility which should be provided near launching ramps is a short dock where once the boater has launched his water craft he may then tie up to the dock while he removes his trailer from the launching ramp. This is especially important if the boater happens to be by himself. He can take his car and trailer to a parking area, then return to his boat and proceed on his way.²³

²² United States Department of Health, Education & Welfare, Environmental Health Practice in Recreational Areas (Washington: Government Printing Office, July 1966), p. 104.

²³ Joe Brown & David G. Wright, Marinas--A Guide To Their Development for Park & Recreation Departments (West Virginia: American Institute of Park Executives, Inc., 1965), p. 19.

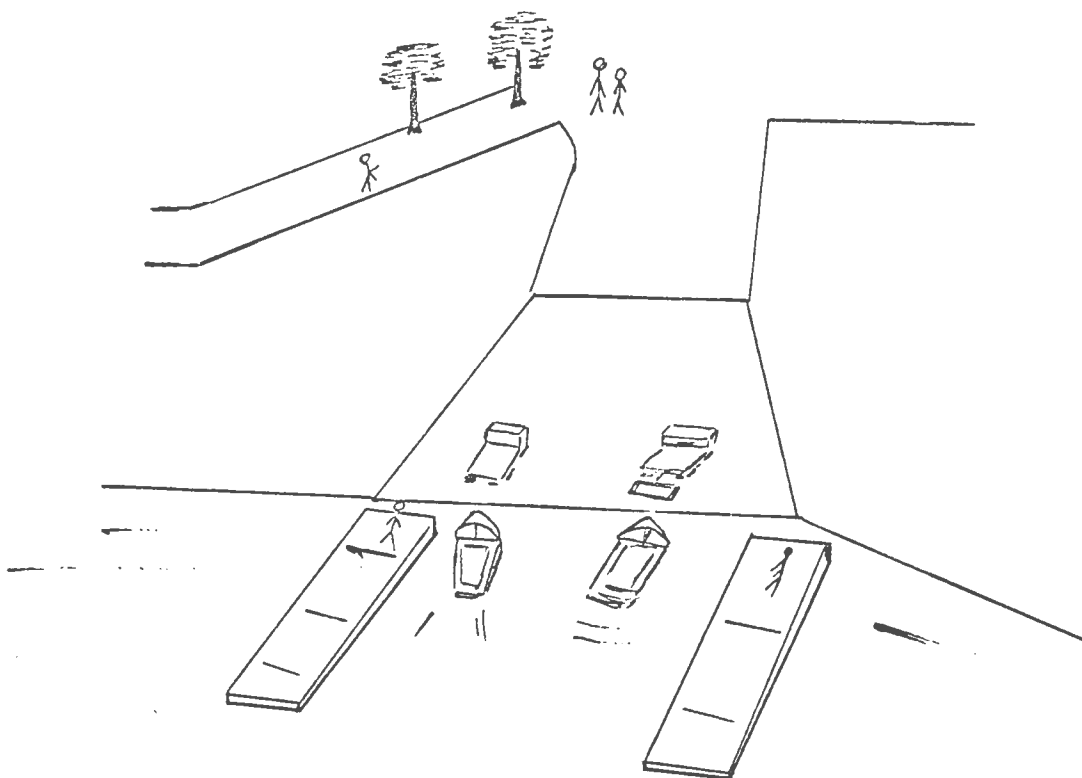


FIGURE IV
LAUNCHING RAMP WITH DOCK

Breakwaters. The waves have various effects upon boats and these effects can only be described as detrimental, for example, causing the craft to break away from their mooring and drift upon other boats. It is necessary to reduce waves to such small amplitude in small craft harbors that the wave energy transmitted through the breakwater will not form waves that will be damaging.²⁴

²⁴Department of Army, Seminar on Coastal Small Craft Harbors (Washington, D.C.: Department of the Army, Office of the Chief of Engineers, 1965), p. 3.

There are many small craft harbor problems common to the various regions of the country as well as specific problems peculiar to a particular region. The greatest of the problems is economically obtaining the degree of quietness needed to provide a safe and convenient haven for the craft.²⁵

Fuel, Water, and Electricity. Properly planned water resource areas should supply the needs of transient and permanent commercial or recreational craft. Fueling and water facilities are as important to the boatsman as the individual driving on a highway. The writer contacted four major oil companies in reference to waterfront fuel facility standards. Only the Mobil Oil Corporation responded and the material sent did not give any standards for fuel facilities.

Galilee leaves much to be desired in providing fuel, water and electricity. Improvements have been made and are continuing to be made, but maximum convenience to boaters is lacking. The available pier facilities are constructed on a common design without regard for boat size.

Patrol Boat. A water patrol unit is the effective instrument for enforcing rules and regulations on a water area heavily used by recreational craft. The patrol unit is necessary to protect both life and property and may be used for emergency first-aid. The patrol craft

²⁵ Ibid., p. 8.

is usually manned by a regular law enforcement officer or constable. Galilee, Rhode Island is fortunate to have a United States Coast Guard Station in the immediate area for maintaining aids to navigation and rescue operations. In addition patrol boats manned by South Kingstown and Narragansett police work in conjunction with the Coast Guard. At times a Department of Natural Resources boat is on hand to enforce fish and game laws and observe other violations. In terms of water patrol, Galilee is well served.

Collection of Sewage. There is no question that increasing pollution is a major factor making water areas unsuitable for recreation and other uses. Pollution not only drives people away, it also destroys large areas of fish and wild life habitat. A system for receiving wastes should be self-contained, efficient, relatively quick and simple to use. One of the original systems available consists of a portable pump that connects with a dockside service fitting on the boat. The pump draws waste from the boat's holding tank and discharges it to a sewer system or to a treatment tank. The latter may be emptied periodically by a waste removal truck. A most convenient location for receiving waste from boats is at the fuel dock, where fueling and discharge can be accomplished at the same time.²⁶

²⁶ Bruno, op.cit., p. 39.

Specific Marine Problems Related to Boating

In a survey conducted for the National Association of Engine and Boat Manufacturers a market research firm found that approximately 1,250,000 requests for slips and moorings were turned down in 1959 due to lack of facilities in the nation. This fact shows that areas in the country providing these facilities are in need of expansion.²⁷ Surveys indicate that about 7,500,000 boats are now in operation throughout this country and that the 5,200 marinas now in existence are grossly insufficient for their berthing.²⁸

The spectacular growth of pleasure boating in recent years as America's most popular family recreation has outpaced the development of boating facilities. In many areas boaters are running into traffic jams at the water's edge because existing facilities for launching, docking, storing and servicing pleasure boats are not adequate to accommodate everyone.²⁹

²⁷American Society of Planning Officials, ASPO Planning Advisory Service, Information Report No. 147 (Chicago: American Society of Planning Officials, June 1961), p. 4.

²⁸Charles A. Chaney, "Pollution and the Marina," Boating Facilities, Vol. 8 (Chicago: Outboard Boating Club of America, March 1967), p. 2.

²⁹Outboard Boating Club of America, Launching Ramps and Piers (Chicago: Outboard Boating Club of America, n.d.), p. 1.

Nineteen thousand sixty-nine motor boats were registered in Rhode Island as of June 30, 1964.³⁰ This does not include sail boats as they are not required to be registered if without motors. No figures on this type of boat are available. Therefore, only personal observation can attest to the fact that one very often has to stop in order to let many of these boats pass by, as they have right of way privileges over other craft.

For the sake of efficiency and safety, water resource planning must consider ways to accommodate small pleasure craft, fire boats, Coast Guard Vessels, the commercial fishing fleet, repair boats, excursion boats, harbor sanitation craft and floating marine construction equipment. This diversity then requires some form of water zoning to accommodate these different craft. As an example, it would be most practical for repair boats to moor near or along side waterfront repair companies, and for fire boats to be located according to fire fighting standards. Commercial fishing boats very often have scattered mooring areas. Separate sections then should be provided for similar activities for mutual advantage. It is reasonable to expect the fishing fleet to be moored near processing plants for several reasons--boats need to unload their catch and take on new supplies such as ice and fuel. Some catches such as lobster are fragile and intermediate

³⁰ Radice Development Company, Planning Study--Jerry Brown Farm Tract (New York: Radice Realty & Construction Corporation, 1967), P.56.

loading--unloading areas may be harmful. Fish processing also includes freezing which necessitates rapid removal from boat to plant to avoid spoilage. Also odors caused by some processing plants and some boats handling this unrefrigerated fish are not compatible with a pleasure boat area.

Small craft areas accommodate boating enthusiasts by providing moorings, berthing, service and storage. It is important that these areas have safe water depths so that an owner need not wait for a high tide to remove his craft. Wind, waves, floods or high tides, large boat wakes and ice are hazardous to the small boat owner because of his lack of experience and the weak construction of these boats as compared to heavier commercial craft. These dangers to the small recreational boater very often need to be eliminated by some form of breakwater to separate him from the commercial fleet, who are as happy to be away from him as he is from them. Very often the pleasure craft are annoyed by fumes, smoke, soot, and sometimes dirty bilge water.

Criteria for Water Resource Planning

WHEN DEVELOPING WATER RESOURCE AREAS (SUCH AS GALILEE) THE PRIMARY REASON FOR THIS DEVELOPMENT MUST BE ITS FUNCTION.

Functions of a water resource area may be a storm or emergency haven, a convenience harbor such as one used for overnight stays, or

temporary tie-ups commonly referred to as transients, a commercial fishing boat moorage, or a recreation center for pleasure boats for seasonal use. Few water recreation areas will be exclusively any of the aforementioned categories. Most will involve some combination of these functions. In any case the planner, when starting his work, should establish this water resource area function quite definitely and develop his plan so that the functional purpose can best be accomplished.³¹

In the case of Galilee, Rhode Island the aforementioned categories are all clearly applicable to this area, as shown in A Survey to Determine A Port Authority For The Point-Judith-Galilee Area of Rhode Island, a report undertaken by the United States Department of Commerce in 1965.

THE LOCATION OF WATER RESOURCE AREAS TO BE
PLANNED AND DEVELOPED SHOULD CLEARLY RE-
LATE TO FUNCTION.

To be successful in its purpose the location must suit a demand. As an example, it would usually be in error to locate a deep-sea commercial fishing harbor twenty miles up a narrow river because of time lost traveling to the fishing grounds. On the other hand, that might be an ideal location for a commercial venture or a recreational center.³²

³¹American Society of Civil Engineers, 'Small Craft Harbors Development, "Progress Report of the Task Committee on Small Craft Harbors, Committee on Ports and Harbors, Journal of the Waterways and Harbors Division, Vol. 90, No. WW3, August 1964, pp. 15-16.

³²Ibid., p. 18.

An emergency haven must be accessible from traveled marine lanes in order that time spent seeking shelter from storms is minimized. Pleasure cruisers should be at locations best suited to serve their functions, be it sport fishing, cruising, or a vacation spot to escape from the city. While it would be favorable for recreational boating areas to be near population centers, one should not make the mistake of locating these small craft harbors close to industrial areas. Not only are there problems of aesthetics, but smoke and fumes are detrimental to varnished and painted surfaces.

WATER SITE SELECTION FOR BOATING FACILITIES
SHOULD BE DETERMINED BY THE NUMBER AND
SIZE OF BOATS TO BE ACCOMMODATED AND SHOULD
BE ACCESSIBLE BY LAND AND WATER.

Efficient accessibility to mooring areas from open waters would rule out a course through treacherous channels with very strong currents or an obstacle course of submerged boulders and shoals; accessibility from a larger body of water would be most desirable. Three major factors which have a bearing on access to boating installations from the water are the depth and fluctuation of the water level, existing or proposed bridges, and proximity to open water. A combination of circumstances may occasionally cause extremely high or low tides on tidal waters, but this is usually within the knowledge of local residents. Tide tables and water charts are extremely accurate devices for determining water depth and tide fluctuations. Tides may

lower the water level so that deep draft boats cannot use the facilities, but these difficulties can be overcome through proper design.³³ Water areas must be accessible to its users by land. For example, fuel facilities would be located where sufficient water depth for boats existed at both low and high tides.

The nature of recreational boating, as with other recreational pastimes for boats, is such that heavy use of the boats, the facilities, and the means of access occurs during the leisure hours at the height of the season. Since pleasure boating is often a full-day affair, peak-hour highway traffic to a marina or access point is liable to be a very high percentage of the average daily traffic. At least one paved or all weather highway, sufficient to carry the expected volume, should connect an area such as Galilee with the commercial center of the locality and major highways.³⁴

Galilee has docking facilities for approximately 240 boats, including the commercial fishing fleet, charter boats and pleasure boats. As of June 1965 there were 98 applicants on the waiting list. However, sufficient water area is available for water requirements--approximately eight acres south of Little Comfort Island and approximately sixty acres east of the Great Island Bridge for small pleasure

³³American Society of Planning Officials, op.cit., p. 16.

³⁴Ibid., p. 9.

craft. The acres stated are for purposes of mooring boats. Sufficient area for actual boating is available north, south, and west of Galilee. Last, but not least, water site selection should provide protection from waves, wash from traffic, winds, tides, and currents. The water chart (map) on page 40 shows the Galilee water area, water depths, and channels. The Harbor of Refuge, where a great deal of recreational boating takes place, is also shown on this chart.

WATER RESOURCE SPACE REQUIREMENTS FOR BERTHING AND MANEUVERING SHOULD BE DETERMINED BY THE NUMBER AND SIZE OF BOATS TO BE ACCOMMODATED.

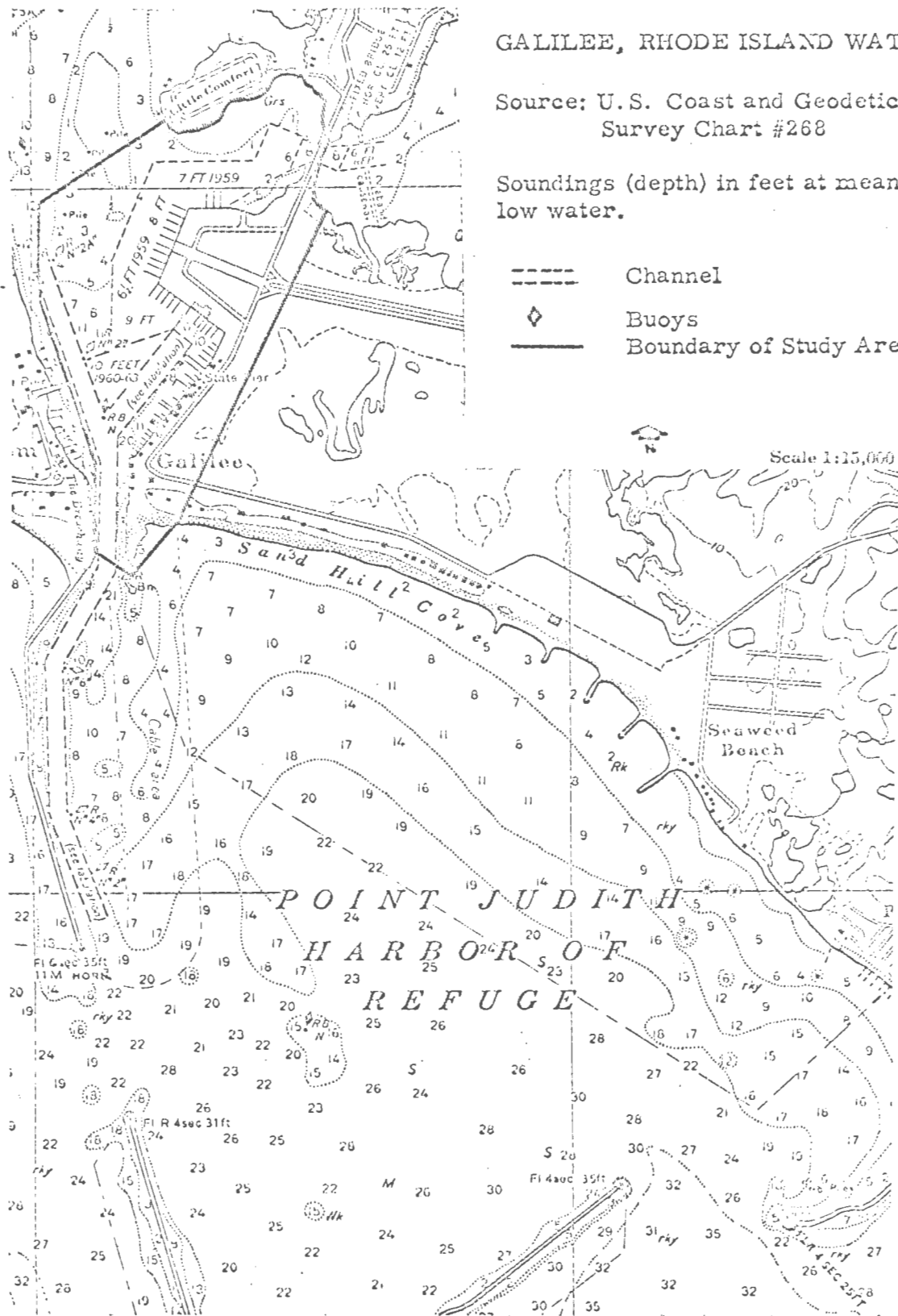
Space requirements must not be considered in terms of present needs alone, but future needs as well. Twelve years ago it was anticipated by the Rhode Island Development Council that 300 new pleasure boats are added to the fleet in Rhode Island each year. This may prove to be a very conservative estimate in view of the present trend. Seven years ago the National Association of Engine and Boat Manufacturers suggested that a ten per cent annual increase in pleasure boating could be anticipated. It is also apparent from observation that pleasure boats are being made wider, and such craft as houseboats and catamarons are becoming more popular. The National Association of Engine and Boat Manufacturers recommend a survey of boats in the present home fleet, with estimations of larger boats that may be added to the home fleet and transient boats that may visit the area in order to determine the size and number of boats to be accommodated and facilities to be provided.

GALILEE, RHODE ISLAND WATER AREA

Source: U. S. Coast and Geodetic
Survey Chart #268

Soundings (depth) in feet at mean
low water.

- Channel
 ◆ Buoys
 — Boundary of Study Area



IN ACCOMMODATING TRAILERED BOATS ONE LAUNCH LANE SHOULD BE PROVIDED FOR EACH FORTY BOATS USING THE FACILITY.³⁵

The United States Army Corps of Engineers recommends that one boat launching lane should accommodate forty boats per day. Depending upon land resource development for parking, this facility could be single or double units. The Corps of Engineers Manual suggests that the number of launching ramps provided be sufficient to prevent not more than one hour delay in launching. At present Galilee has a deficit of one lane using the above criteria. An additional lane would decrease the possibility of congestion in the area by allowing boat owners to place their craft in the water sooner and with a minimum of delay. Since many persons using portable boats (boats on trailers) enjoy fishing during the night or early morning hours, ramps should be so located as to limit the voice or headlight glare that could disturb adjoining property owners or persons who reside on board boats moored in the area.³⁶

In addition the designer must consider the limited ability these part time boaters have in handling trailers, and great care must be exercised to protect the individual and his property from waves and wind. As an example, a ramp was located in Narragansett, Rhode Island.

³⁵Department of the Interior, Bureau of Outdoor Recreation, Outdoor Recreation Space Standards (Washington: Government Printing Office, April, 1967), p. 25.

³⁶American Society of Planning Officials, op. cit., p. 20.

Poor planning of motor vehicle circulation and a ramp that was too steep resulted in several cars half submerged at the end of the ramp. Consequently, this facility was closed down soon after it was made available to the public.

IN PLANNING WATER RESOURCE AREAS THERE SHOULD BE ONLY ONE WATERSIDE ACCESS TO RECREATIONAL BOATING FACILITIES.

In order to assure orderly marine traffic control, the American Society of Civil Engineers recommends one waterside access. Orderly traffic control and the reduction of vandalism, which is at an alarming increase, are important concerns.³⁷

It is possible that in many cases one waterside access point could reduce the ability of tides to flush a basin or cause some type of shoaling. These are highly technical problems which would be best answered by the United States Army Corps of Engineers. The writer suggests contacting the United States Army Engineer Waterways Experiment Station, Vicksburg, Mississippi when such a technical problem occurs.

IN ORDER TO EXERCISE CONTROL OVER MARINE TRAFFIC, HARBOR MASTER FACILITIES SHOULD BE SO LOCATED AS TO BE ABLE TO OBSERVE AND REGULATE THIS TRAFFIC AND ALSO PROVIDE SECURITY FOR MOORED CRAFT.

While boating is increasing at a phenomenal rate, more inexperienced operators are using the waters. In addition and unfortunately

³⁷American Society of Civil Engineers, op.cit., p. 29.

many boat operators become a nuisance to other participants. Thomas H. Stratton, Boating Administrator of the Department of Transportation in Hawaii, states the problem very clearly, "... Power boaters, canocists, sail boatmen, fishermen, swimmers, waterskiers, and scuba divers are all attempting to use congested water areas."

It is evident that certain rules and regulations must be observed with a critical eye. Just as the planner would give care to locating a police station near the center of a city it is obvious that the harbor master facilities must be integrated with the water resource area. For marine traffic, some harbors provide a harbor master with headquarters located so that he can observe and direct all boats entering and leaving the area and can observe activities within the harbor at all times. The harbor master is sometimes located in a tower where he can overlook the area and operate with a public address system through which he may direct visitors, control traffic and detect violators of harbor regulations.³⁸

IN PLANNING BERTHING AREAS, SUCH AS SLIPS FOR
BOATS OF ALL TYPES, CLEARANCES BETWEEN
OPPOSITE SLIPS SHOULD BE BEYOND THE BEAM
(WIDTH) AND LENGTH OF THE BOATS.³⁹

For example, when providing parking space for automobiles, 300 square feet would probably be common acceptance. When dealing

³⁸Ibid., p. 29.

³⁹Chaney, Marinas--Recommendation for Design, Construction and Maintenance, op.cit., p. 33.

with boats there is a greater variety of sizes and different means of power, such as sail, oars, propellor (one or two) all having unique characteristics in maneuverability. In addition automobile drivers have a somewhat common degree of skill attainment because of the requirements necessary for them to operate a motor vehicle. Unlike the professional commercial fisherman the recreational boater very often lacks skill in maneuvering his boat. Therefore, in the interest of safety and ease of maneuverability the above criteria would not be unreasonable.

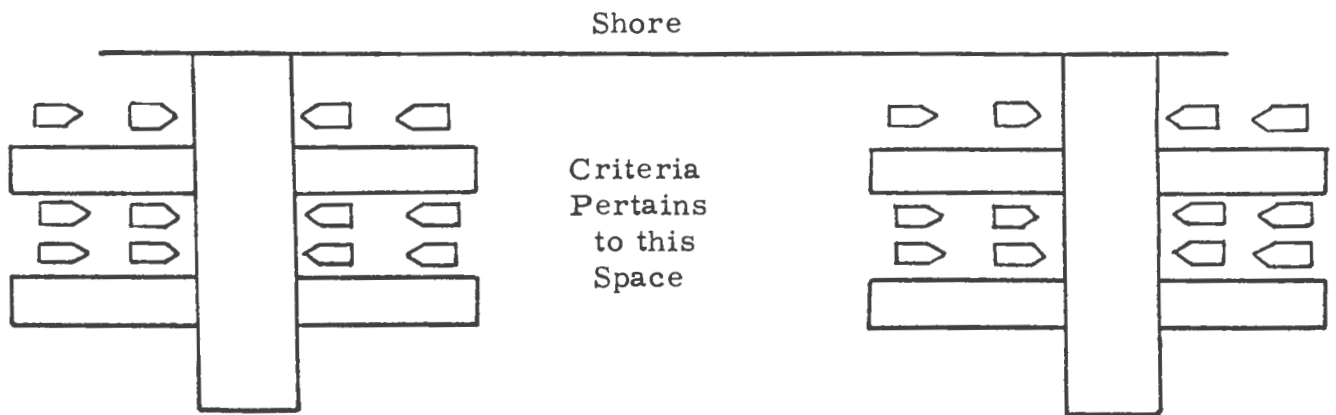


FIGURE V
CLEARANCES BETWEEN SLIPS

THE ENTRANCE TO A HARBOR OR BERTHING AREA SHOULD BE SO LOCATED AND WIDE ENOUGH TO PERMIT THE SPEEDY AND SAFE PASSAGE OF BOATS IN TIME OF STORMS, FIRE OR OTHER EMERGENCY.⁴⁰

In the case of Galilee sufficient water area exists to permit speedy and safe passage of boats particularly for the commercial fleet and other large recreational craft provided the channel along the state piers is deepened and widened. While adequate facilities have not yet been provided for commercial small recreation craft, enough water area does exist for wide and safe channels. In spite of inadequate and hazardous navigational conditions that exist in the Galilee area, the Atlantic Tuna Tournament has chosen the Galilee area many times since 1955 because of excellent fishing conditions off Galilee.⁴¹

Navigational improvements offer a tremendous potential for future recreational development in this area.⁴² Such navigational improvements are a straighter channel from the Harbor of Refuge to the Galilee area, enlarged anchorages, and a deeper channel to Wakefield where boats may seek additional refuge in case of hurricanes. The American Society of Civil Engineers recommends that minimum channel width be five times the beam (width) of the largest vessel using the channel.⁴³

⁴⁰Ibid., p. 36.

⁴¹South Kingstown Waterfront Resources Committee, op. cit., p. 3.

⁴²Ibid., p. 3.

⁴³American Society of Civil Engineers, op. cit., p. 57.

These navigational improvements would also allow larger commercial vessels to visit Galilee to sell their catch and enhance the economic prospects of the area through spending money for supplies, fuel, etcetera.

IN PLANNING FOR THE SAFETY OF MOORED CRAFT, PARTICULARLY SMALL RECREATIONAL CRAFT, BREAKWATERS OR FLOATING BAFFLES ARE GENERALLY NECESSARY TO PROTECT THESE CRAFT FROM ROUGH WATER DAMAGE.

The design of a small craft area requires some measure to protect craft from wave action caused by wind or other boats. In the Galilee area wave conditions are not nearly as harsh as found outside the harbor. With this in mind, it is only necessary to protect against those disturbances set up in the harbor itself. Not only will such measures provide protection from wave action, but depending upon orientation will reduce the amount of debris and floating ice which is prevalent at certain times of the year.⁴⁴

WATER RESOURCE PLANNING SHOULD INCLUDE ZONING OF THESE WATER AREAS WITH RESPECT TO FUNCTION SUCH AS COMMERCIAL OR RECREATIONAL BOATING.

Water resource areas have become subject to intensive use. We live in a world of controls and regulations. These are necessary in

⁴⁴Wisconsin Department of Resource Development, Small Craft Harbors--Wisconsin Development Series (Wisconsin: Department of Resource Development, 1965), p. 37.

order that we may enjoy some individual freedom and that all may have equal opportunity to benefit from those things which are in the public domaine.⁴⁵

The shallows of a water area are often a zone in which many aquatic activities are concentrated. When activities such as boating and water skiing with high space consumption transgress on activities with low space consumption such as swimming, or scuba diving zoning for certain uses is justified.⁴⁶

Water-born wastes have been recognized as one of the major limitations of water recreation areas and can be a hazard to health. In addition many accidents have occurred because of persons swimming where boats were passing by. Accidents could also occur when pleasure boats get too close to maneuvering commercial craft. Avoiding such conflicts justifies some form of water zoning.⁴⁷

Euclid v. Ambler Realty Company (272 U.S. 365, 1926) was the milestone case in proving the legality of zoning. The Supreme Court

⁴⁵George T. Wilson, Lake Zoning for Recreation, Bulletin No. 44 (West Virginia: American Institute of Park Executives, Inc., 1964), p. 6.

⁴⁶Ibid.

⁴⁷John R. Sheaffer and Arthur J. Zeizel, The Water Resource in Northeastern Illinois: Planning Its Use, Technical Report No. 4 (Chicago: Northeastern Illinois Planning Commission, June 1966), p. 79.

held that zoning is constitutional in principle as a valid exercise of the police power when reasonably related to public health, safety, morals, or general welfare.⁴⁸

Most activities on water take place near the shore. Thus crowding and conflicts between activities are most intense here. Commercial fishing boats should not have to compete with recreational craft for facilities, nor should they be forced to give way to small sail craft who have the right of way because they are under sail and venture into commercial working areas.

The facilities at Galilee are limited. Planning and zoning is needed to reduce conflicts among competing users. Thomas H. Stratton, Boating Administrator for the State of Hawaii, in a letter to the writer stated, "...To date the most equitable manner of solving the water user conflict and insuring insofar as possible the basic premise of equal rights to all users, is to zone various water areas for a specific use."

Bruce T. Wilkins in his study on Outdoor Recreation and the Commercial Fishery in the town of Southold, Long Island, New York stated, "...Although the commercial fishery lends support to the town's attractiveness to recreational boaters, conflicts (such as competition for berthing space and facilities) between the recreationist and the commercial fisher will occur. Typically the answer is to allot each group

⁴⁸Naninni Giulio Martucci, Coastline and Oceanographic Zoning: Use of Marine Resources and Hydrospace (Master of Community Planning thesis, 1967), p. 41.

a portion of a broader area, a portion in which their preference alone is exercised. Such zoning of water areas or underwater land appear to be among those actions which should have wider application in this town."

Segregation of commercial fishing activities and recreational boating activities would encourage fuller utilization of the facilities available to each and would protect and promote the successful operation of commercial and recreational development.⁴⁹

Galilee then can benefit greatly from such zoning. At present the deepest water areas would be most practical for the commercial fleet, while shallower water areas do exist and would be more practical for the recreational craft.

IN PLANNING WATER RESOURCE AREAS FOR BOAT FACILITIES THE WATER AREA SHOULD BE COMPLEMENTED BY AT LEAST AS MUCH LAND (PREFERABLY LEVEL AND UNDEVELOPED).⁵⁰

While accommodating land areas are important, circumstances will be the determining factor. The American Society of Civil Engineers feel a recreational water area may require a landside area several times the size of the water area accommodating pleasure boats.⁵¹ While

⁴⁹North Kingstown Planning Commission, Wickford Harbor Study (Rhode Island: Rhode Island Development Council, 1960), p. 7.

⁵⁰Chaney, Marinas--Recommendation for Design, Construction and Maintenance, op.cit., pp. 30-32.

⁵¹American Society of Civil Engineers, op.cit., p. 19.

Charles A. Chaney, a professional engineer and one of the foremost authorities on marinas, feels land area requirements are at least equal to the water area, since boating is increasing at a phenomenal rate, planners with foresight would plan for maximum rather than minimum accommodating land wherever possible.

In planning water areas, whether it be commercial or recreational, maximum convenience and comfort for boat owners should be a major consideration. Thus it is obvious that we must integrate land and water planning. Each pleasure boat would generally cause a demand for one parking space, and possibly another for guests. One might then consider extra space necessary for boat trailers. Each commercial boat, at least in the Galilee area, would cause a demand for at least three or more parking spaces. The counterpart to this thesis, "A Study of Land Resources Used for Boating in Galilee, Rhode Island," by Mr. Donald Sikorski covers those factors of land planning that are necessary to insure harmony between land and water use.

IN PLANNING WATER RESOURCE AREAS MOORING
AND BERTHING AREAS SHOULD BE SO LOCATED AS
TO PERMIT QUICK EVACUATION IN CASE OF FIRE
OR OTHER EMERGENCY.

Fire is probably the hazard most to be guarded against due to the presence of gasoline and the chance of its getting into bilges or other confined spaces.⁵²

⁵²Andrew R. Mack, Boat Handling Equipment in the Modern Marina (New York: The National Association of Engine & Boat Mfg. Inc., 1959), p. 63.

Congestion should be avoided in berthing areas and enough space between main piers provided to allow for convenient maneuvering at all times.

Single entrance-exit access should be accessible from all parts of the berthing and mooring area, and large enough for two lines of boats to move rapidly during emergencies. It is necessary that access be available to each boat and float for emergency removal without the necessity of moving any other boats.⁵³

IN PROVIDING FACILITIES ON WATER RESOURCE AREAS, PLANNERS SHOULD ASSUME THAT FIFTY PER CENT OF THE PLEASURE CRAFT WILL BE LAUNCHED, HAULED, AND STORED BY THE INDIVIDUAL OWNERS.⁵⁴

One of the largest generators of recreational boating has been the boat trailer and outboard motor. The trailer has enabled boaters to transport their craft many miles from home. The implication here is that many boat owners do not require seasonal facilities. These boat owners may prefer to keep their craft at home where they may work on it and feel assured of its safety. Many boaters travel all over the state and also out of state with their trailered boats in search of new fishing grounds and the opportunity to use their boat in another area. While it may be assumed that many persons fall in this category, a

⁵³ National Fire Protection Association, Marinas and Boatyards 1966 (Massachusetts: National Fire Protection Association, 1966), p. 6.

⁵⁴ Chaney, Marinas--Recommendation for Design, Construction and Maintenance, op. cit., p. 30.

survey of recreational boat owners would give a greater degree of accuracy. Although many boating enthusiasts will be hauling their boats on trailers, it must also be assumed that if more facilities were available more persons would use them. While a family might only visit an area for a day, facilities must be provided if only to accommodate persons wishing to stroll about. In the case of Galilee, the commercial fleet and other attractions draw many such spectators from the water to walk about and purchase food or beverage.

As previously stated, in considering planning facilities for recreational pleasure craft planners must anticipate a minimum 10 per cent annual increase in this type of recreation.⁵⁵ Completely accurate statistics are hard to determine. The Outboard Boating Club of America states that pleasure boating is America's most popular recreation. By the year 1980 the Bureau of Recreation predicts boating will have increased 76 per cent since 1965; and by the year 2000 a 215 per cent increase is expected from 1965.⁵⁶ Twenty-two per cent of the population engages in boating, two per cent in canoeing, and two per cent in sailing (For statistical purposes the Bureau of Outdoor Recreation has separated boating, canoeing and sailing.) which shows that approximately one-fourth of the population engages in boating of one type or another, and the obvious need for reserving water-land resources for future demand.

⁵⁵Ibid., p. 30.

⁵⁶Department of the Interior, Bureau of Outdoor Recreation, Outdoor Recreation Trends (Washington: Government Printing Office, April 1967), p. 17.

As stated by Charles Chaney in The Modern Marina, it all adds to the fact that increasing millions of our citizens and their families are enjoying this wholesome, healthful recreation. Therefore, the importance of boating as a recreational outlet should receive increased attention from city planners whose job it is to look into the future and adequately provide for such needs in their comprehensive plans.⁵⁷

⁵⁷American Society of Planning Officials, op. cit., p. 4.

IV

LAND RESOURCES CRITERIA

This chapter deals with land resources criteria and is a condensed version of the work of Mr. Donald Sikorski, "A Study of Land Resources Used for Boating in Galilee, Rhode Island."

The boating uses in Galilee, Rhode Island are commercial fishing, ferry service to Block Island, sports and charter fishing, and recreational or pleasure boating. These boating types result in many problems. The fishing industry is quickly becoming outmoded by change i. e. its position as a competitive market will remain dubious unless expansion and planning occurs in the near future.

The ferry transportation service lacks a good location and area for automobile parking and boarding. The charter fishing boats are a magnet for many enthusiastic fishermen who come to Galilee every summer; however, their parking areas are insufficient in size. Also there appears to be a lack of adequate berthing facilities which are desirable for these enthusiasts.

The rapid increase in recreational boating without little in the way of supporting land facilities has resulted in congestion and mixed land uses. As a whole these boating activities have been a catalyst

for waterfront development which was quickly constructed and hampers public access to the water, making it visually unattractive and nearly inaccessible. The facilities and parking areas for tourists are inadequate and they place great summer time demands upon the existing facilities.

The supporting land facilities which compliment these boating types are many and varied. Some are specialized, others are overlapping and allow use by more than one boating type.

Facilities which should be ideally considered in planning for areas such as Galilee include net sheds, repair yards, equipment for unloading fish and gear, fish handling and processing plant, cold storage and icing facilities, marine supply and provision store, machine shop, instrument and radio shop, electrical and water service, sanitary facilities and showers, good access roads, long period automobile parking areas, adequate parking areas for tourists and fishermen, boat trailer parking areas, public launching ramp, bait and tackle shop, restaurant and bar, deluxe restaurant and bar, motel or hotel, concessions, boat sales store, and repair and service facilities. Also, important control uses such as supervisory and harbor master headquarters, fire protection and first-aid should be considered.

The criteria which were developed were an attempt to create greater efficiency in relating the activity of the harbor functions and

facilities which are existing and might be developed in the future. A summary of the criteria follows.

SUPPORTING LAND USES SHOULD BE LARGELY DEPENDENT UPON THE HARBOR FUNCTION.

The harbor function will either be specialized because there is only one function, or multi-functional. In the Galilee study area six functions are evident as noted in Chapter III. These are storm or emergency haven, a convenience harbor, commercial fishing harbor, recreational harbor, transportation center, and in time of war a coastal defense harbor.

The supporting land facilities related to the functions can be grouped into three major categories--control uses, common uses, and specialized uses. The control uses are those which are administrative or supervisory in function. The common uses are those that cater to satisfy the demands of all boating types i. e. restaurants, sales stores, sanitary facilities, and the like. The specialized uses imply that the use is only utilized by special boating interests, such as the commercial fishing facilities or trailer parking for launching boats.

SUPPORTING COMMERCIAL FACILITIES SHOULD BE LOCATED ACCORDING TO THE SERVICE THEY PROVIDE, THE NEEDS WHICH THEY DEMAND, AND ACCESS REQUIRED BY BOATERS.

When considering locations for commercial establishments, six principles are helpful.

1. Stores should be relatively close to berthing areas to insure easy access for boaters.
2. A sufficient amount of land should be retained between the retail establishments and slips so that access to boats is not impeded, spectator areas are provided, and landscaping is planted.
3. Preferably the establishments should be constructed on relatively level land to reduce the cost of construction and facilitate easy access.
4. The center should be in such a location that it is easily accessible from the main entrance to the facility and other parts of the site.
5. The establishments should be visible and readily accessible from the highway.
6. Stores should be grouped according to selling power, visual access, requirements, and service needs.

The land area needed for facilities has been established and tested by Mr. Charles Chaney. When many activities exist such as in larger marina operations with boat handling areas, sales rooms, restaurants, and the like, one and one-fourth to one and three-fourths acres of land are needed for each acre of water. However, for the smaller facility, which basically receives fishing traffic and trailered boats, one acre of land is needed for each acre of water.

The needed facilities are dictated to a large degree by the demands placed upon existing facilities. However, in all probability commercial establishments will be constructed as more people enjoy visiting such water areas to partake in and view the boating activities. Therefore, it is important to establish districts where commercial activities will result in efficient utilization of the existing land area.

ALL LAND USES ALONG THE WATER SHOULD BE ARRANGED TO MAKE THE BEST USE OF THE SURFACE WATER.

Industrial uses of waterfront locations are for four reasons:

1. Availability of raw water for manufacturing or processing purposes.
2. Need for disposal of wastes created in the manufacturing process.
3. Convenience in the production and maintenance of water-related products such as fishing equipment.
4. Capitalization of various resources from the sea as in commercial fishing.

In Galilee the utilization of land for these purposes is focused primarily upon the commercial fishing industry for unloading an extractive resource from the sea. Also, the machine shop utilizes such a site because it repairs a water-related product. The residential uses are usually built along waterfronts for aesthetic purposes, but in the harbor area they should be eliminated because they are not compatible with other functions of the harbor. Districts should be established for locating the facilities associated with all the harbor functions.

IN PLANNING THE WATERFRONT AREA IT IS IMPORTANT TO STRIVE TOWARD MAXIMUM ACCESS TO THE WATER.

The great tourist demand placed upon such an area creates a need for good visual and physical access to the waterfront. The area should accommodate this need and afford the visitor with a world different from the everyday life of the city.

ROADS SHOULD BE DESIGNED TO PERMIT EFFICIENT
TRAFFIC MOVEMENT AND ELIMINATE CONGESTION.

The roads should be constructed according to approved standards.
so there is adequate provision for safety and efficiency. Also parking
areas and ferry waiting lanes should be located to keep traffic circu-
lation on the main waterfront street to a minimum.

PARKING AREAS SHOULD BE LOCATED AS CLOSE AS
POSSIBLE TO BOAT DOCKING AREAS, AND LAUNCH-
ING RAMPS AND ADEQUATE SPACE SHOULD BE
PROVIDED.

It is necessary to provide boaters with a parking area close to
the docks so that gear may be transferred easily from automobile to
boat and vice-versa. The trailer parking area needs about 600 square
feet of maneuvering and parking space for each vehicle with trailer and
a design that permits the vehicles to move efficiently from ramp to
parking space. Parking requirements to be considered are:

1. One space for each transient boat.
2. One and one-half spaces for permanently moored boats.
3. One space for each three spaces on a sightseeing or
party fishing boat.
4. One space for every two employees working in a fish
processing plant.
5. Three to four feet of parking area for each square
foot of floor space devoted to retail business.

THE HARBOR MASTER'S HEADQUARTERS SHOULD BE
LOCATED ALONG THE WATER AND IN VIEW OF BOAT
TRAFFIC WHICH ENTERS AND EXITS THE HARBOR.

The multi-functional harbor needs good control and regulation
of boating traffic. This can be administered from a good visual and

physical vantage point of harbor traffic from the land. This control will help reduce hazards evident with growing boating demands.

SUPERVISORY HEADQUARTERS SHOULD BE LOCATED IN THE AREA WHERE AUTOMOBILE TRAFFIC ENTERS AND EXITS.

The visitor will benefit from a location of supervisory headquarters near an entrance or exit because upon one's arrival this facility is easily accessible and available for purposes of direction and guidance within the harbor area.

SEPARATE GROUPED MALE AND FEMALE SANITARY FACILITIES SHOULD BE PROVIDED IN THE HARBOR AREA.

The sanitary facilities should be planned in order to encourage their use rather than allowing the use of portable boat units in the harbor because water pollution might result. These facilities should be planned with one for every twenty to thirty boats placed at maximum distances of 500 feet apart and 350 feet from docking areas.

IT IS ESSENTIAL TO HAVE SUFFICIENT ELECTRICAL FACILITIES FOR THE PUBLIC CONVENIENCE AND SAFETY.

An adequate supply of electrical facilities is essential because boats need current for the equipment which is similar to that in one's home. Boat owners require adequate lighting in berthing areas to avoid accidents at night and to aid in docking their craft.

IT IS BENEFICIAL TO INSTALL SEPARATE FACILITIES CLOSE TO THE COMMERCIAL DOCKING AREAS FOR THE COMMERCIAL FISHERMEN.

The commercial fishermen need substantial, clean facilities without the fancy frills offered to the tourists. Utility is placed ahead of appearance and facilities with no attached costs or fancy decor is desired by fishermen who wish to relax and discuss the day's business without the added noise and congestion of tourists and other boating associated persons.

SERVICE YARDS AND BOAT REPAIR FACILITIES SHOULD BE DEVELOPED ACCORDING TO THE ADEQUACIES OR INADEQUACIES OF OTHER NEARBY FACILITIES.

It is possible that nearby facilities do not permit competition from those currently being considered for development. This being the case it would be unwise to develop such facilities incapable of supporting themselves due to competition in nearby areas.

APPLICATION OF CRITERIA TO GALILEE, RHODE ISLAND

In this chapter the criteria developed in Chapter III will be applied to Galilee, Rhode Island. A schematic design concludes the chapter.

WHEN DEVELOPING WATER RESOURCE AREAS, THE
PRIMARY REASON FOR THIS DEVELOPMENT MUST BE
ITS FUNCTION.

The Galilee water area is primarily a commercial fishing port. Boatyards and suppliers catering to the commercial fishermen are active year-round industries. The area includes extensive, although not ideal, facilities for commercial fishing, sport fishing, recreational boating, and swimming. The principal year-round activity is commercial fishing which includes the fish dehydrating plant and the fisherman's cooperative which processes and exports edible fish from Rhode Island.

Not only is Galilee a commercial fishing port, but the area is a center of pleasure boating and sport fishing for Rhode Island and nearby Connecticut and Massachusetts. Approximately 150 large sport fishing boats come to Galilee each year for the annual Atlantic Tuna Tournament. A large number of charter boats operate from Galilee primarily for recreational fishing parties and cruises.

It is obvious that Galilee functions as both a commercial fishing port and a center for recreational boating; and due to its location on the

ocean, Galilee is both a convenience harbor and an emergency haven. The growth of recreational boating and commercial fishing activities in Galilee suggest the need that Galilee be developed as both a commercial and a recreational area. The area is undergoing rapid deterioration and has suffered from poor planning as will be shown in the following pages.

THE LOCATION OF WATER RESOURCE AREAS TO BE
PLANNED AND DEVELOPED SHOULD CLEARLY RELATE
TO FUNCTION.

The Galilee water area is ideally located with respect to its functions as a commercial and recreational boating area. The location of Galilee with respect to the ocean areas is ideal for both commercial and pleasure fishing.

Rhode Island waters are regarded by many sports fishermen as the most rewarding in the world. Record individual catches include striped bass, bluefish, tautog, cod and flounder, with striped bass in the 55-60 pound category taken yearly. The United States Atlantic Tuna Tournament and the Rhode Island Tuna Tournament are held in Galilee. Record tuna have been caught by boats out of Galilee. Countless good fishing spots exist along the shore.⁵⁸

For the commercial fleet the Galilee area is favorably located to accommodate the fishing industry. It is close to the fishing grounds of

⁵⁸Charlestown Tourist Association, Charlestown, Rhode Island Welcomes You (Rhode Island: Charlestown Tourist Association, n.d.) p. 1.

the Atlantic Ocean and within easy shipping distance of New York. Its docks are located almost directly on the coast and the entrance to the harbor is protected by breakwaters forming the Harbor of Refuge.

The location of the Galilee water areas is one of the finest natural shelters to be found along the Rhode Island coast. Its location within a mile of Block Island Sound places it within easy reach of cruising and fishing waters. Location clearly relates to commercial and recreational functions in the Galilee water area so well, in fact, that current deterioration of the area should be prevented at all costs.

WATER SITE SELECTION FOR BOATING FACILITIES
SHOULD BE DETERMINED BY THE NUMBER AND SIZE
OF BOATS TO BE ACCOMMODATED AND SHOULD BE
ACCESSIBLE BY LAND AND WATER.

Under ideal conditions boating statistics would greatly aid in planning the Galilee water area. Unfortunately only total state statistics are currently available. Officials of the Motor Boat Registration Office at the State House in Providence, Rhode Island are considering compiling boat data by towns in the future, as they have had several requests for such information. As stated in Chapter III on page 34 19,069 boats were registered in Rhode Island as of June 30, 1964, and this is the most recent data available.

In a joint survey conducted by the National Association of Boat and Engine Manufacturers and the Boating Industry Association it was estimated that 36,000 outboard motors were in use in Rhode Island as of December 31, 1967. While obvious discrepancies exist in the Rhode

Island boat count, as sailboat owners are not required to register their boats if without motors, the writer feels that state officials are aware of these problems and are attempting to gather more accurate data.

Site selection for facilities in Galilee must be accomplished without recreational boat statistics. Fortunately, the commercial boat information is available. It is the writer's contention that commercial facilities should be planned in accordance with known statistics, and that the small boat area south of Little Comfort Island be planned to accommodate 250 boats in its first stage of development. The area is approximately eight acres. Two hundred fifty boats would use five of the eight acres, leaving three acres to be developed depending upon demand and utilization of land on Little Comfort Island. Marina operators on Salt Pond state the average size of a pleasure boat in Rhode Island is thirty feet. Based on the chart on page 24, five acres of water area would accommodate 250 boats of this size. Water use areas are shown on page 79.

WATER RESOURCE SPACE REQUIREMENTS FOR BERTHING AND MANEUVERING SHOULD BE DETERMINED BY THE NUMBER AND SIZE OF BOATS TO BE ACCOMMODATED.

As previously stated, space requirement need is dependent upon certain boating statistics which in the case of Galilee are partially unknown. Mr. Stephen M. Olko, of Olko Engineering Consultants, in an address before the Marine Trades Association on March 17, 1960 stated that utilities and services offered by competing marinas are necessary to a balanced boating facility. In a speech to the same association on December 15, 1965, Mr. Olko suggested developing facilities to the

maximum extent practical because of waterfront becoming more scarce in the future than is the case at the present.

In the near future it is evident that the trend will be for a greater standardization of boating facilities such as berth size due to difficulty in predicting the long range future of such areas.⁵⁹ For this reason the writer recommends planning the recreational boating area south of Little Comfort Island for thirty foot pleasure craft, as this is the average boat size in Rhode Island. Also it has been observed that marina operators in this area utilize standard mooring facilities.

TABLE III
BOAT TYPES
DISTRIBUTION BY PER CENT IN THE UNITED STATES

Boat Type	United States Percentage
Inboard	7.2
Outboard	58.2
Auxiliary Sail and Sail Without Power	6.8
Miscellaneous	27.8

NOTE: Statistics were compiled by the Seattle District Corps of Engineers and the Pacific Northwest Region Bureau of Outdoor Recreation, Pleasure Boating Study, 1967.

⁵⁹ Stephen M. Olko, "Marinas and Yacht Clubs--Planning and Financing," Civil Engineering

The preceeding boat types and percentages could be of some aid in determining space requirements by giving the planner some insight as to the type of boats for which he must provide facilities. Table I on page 24 indicates water space requirements for pleasure boats. Table II on page 26 shows typical boat sizes found in Rhode Island.

Galilee has approximately 43 commercial fishing draggers using the harbor as a home port. These vessels are from 30 to 85 feet long and have a beam (width) of 17 to 20 feet. Approximately 12 commercial lobster boats from 22 to 30 feet long with a beam of 12 feet also make Galilee their home port. Approximately 14 charter and party boats use Galilee as a home port. The difference between the two is that party boats take passengers fishing on a regular schedule while charter boats require reservations. These boats have an average length of 47 feet with an average beam of 14 feet.

Existing water space utilization at Galilee is inefficient, but efficient utilization of such space is possible. The schematic design on page 79 is meant only as a guide for suggested water use areas by boat types based on all the criteria contained in this thesis.

IN ACCOMMODATING TRAILERED BOATS ONE LAUNCH
LANE SHOULD BE PROVIDED FOR EACH FORTY BOATS
USING THE FACILITY.

Galilee presently has one launch lane. No official statistics are available on its use, but the writer interviewed merchants in the area and the general consensus was that from 40 to 60 boats used the

facility during summer days. On this basis it is suggested that Galilee have two boat ramps to accommodate the recreational boater during the summer season. While two ramps are somewhat more than is presently needed, one ramp is not sufficient as boaters frequently have to wait in line to use the existing facility. It is recommended that the ramps be located as shown on page 79 because of ease of access, adequate space for parking and maneuvering. The writer was unable to determine why the existing facility is located in its present area for any other reason than access from Great Island Road.

The ramps should be constructed with an optimum slope of 12 per cent, minimum slope of 10 per cent, and maximum slope of 14 per cent. If the slope is too shallow, the trailer will have to be backed far out into the water before the boat itself can be floated from the trailer. If the slope is too steep, there is danger that the car will not be able to get sufficient traction to pull the trailer back out of the water.

Adequate turning area at the boat launching ramp is necessary so that an experienced driver can easily back his trailer into the water.⁶⁰ A single ramp should have an optimum width of 12 feet and should not be less than 10 feet. Finally, a small dock or pier should be provided near

⁶⁰ Charles C. Stott, Evaluating Water Based Recreation Facilities and Areas, Bulletin No. 70 (Washington: National Recreation & Park Association, 1967), p. 34.

the launching ramp where the boat operator can tie up to pick up passengers and equipment, or where he can tie up while he removes his trailer from the launching ramp.⁶¹ Such a small dock or ramp is not provided at the present facility in Galilee, but is recommended as it would greatly accommodate users of the ramps.

IN PLANNING WATER RESOURCE AREAS, THERE SHOULD
BE ONLY ONE WATERSIDE ACCESS TO RECREATIONAL
BOATING FACILITIES.

Ideally to assure orderly traffic control and to reduce vandalism one waterside access to recreational boating facilities would be desirable. Such a measure is possible at Galilee and could serve a two fold purpose, the other being one of protection for small craft within the area.

To implement this criteria the writer suggests a breakwater to be constructed in a southeasterly direction from the point of Little Comfort Island approximately 400 feet; then an easterly direction for approximately 175 feet, as shown on page 79. Also an alternate breakwater, as shown on page 70 may offer greater protection to all craft in this water area. The breakwaters would not only provide control, security, and safety for small craft, but small recreational craft would be separated from the commercial fleet, an advantage discussed earlier in this study. However, the writer suggests that an engineering study be conducted to determine the feasibility of the breakwaters shown. Breakwaters often

⁶¹ibid., p. 35.

interrupt littoral drift (the movement of sediment by waves and currents) which could result in shoaling. The interruption of littoral drift could also cause a problem of erosion causing the breakwaters to cave in.⁶²

IN ORDER TO EXERCISE CONTROL OVER MARINE TRAFFIC, HARBOR MASTER FACILITIES SHOULD BE SO LOCATED AS TO BE ABLE TO OBSERVE AND REGULATE THIS TRAFFIC AND ALSO PROVIDE SECURITY FOR MOORED CRAFT.

At Galilee at present harbor master facilities are located directly across the street from the state pier. This present location does not allow the harbor master to observe and direct boats entering and leaving Galilee. The writer recommends that harbor master facilities in Galilee be located approximately 100 feet northwest of the Fish Meal Plant, in a tower approximately 90 feet high. Such height and location would allow the harbor master fine views of both North and South. A view to the north would be of the small recreational craft area, and to the south, the commercial area. Boats entering and leaving Galilee and those in difficulty would be under close observation. Such a facility in communication with patrol units from Narragansett, South Kingstown, and the United States Coast Guard could be considered an asset for the Galilee water area.

IN PLANNING BERTHING AREAS, SUCH AS SLIPS FOR BOATS, CLEARANCES BETWEEN OPPOSITE SLIPS SHOULD BE BEYOND THE BEAM (WIDTH) AND LENGTH OF THE BOATS.

Galilee at present has no facility that this criteria can be applied to. At Galilee boats are as shown in Figure VI on the next page.

⁶²American Society of Civil Engineers, op. cit., p. 52.

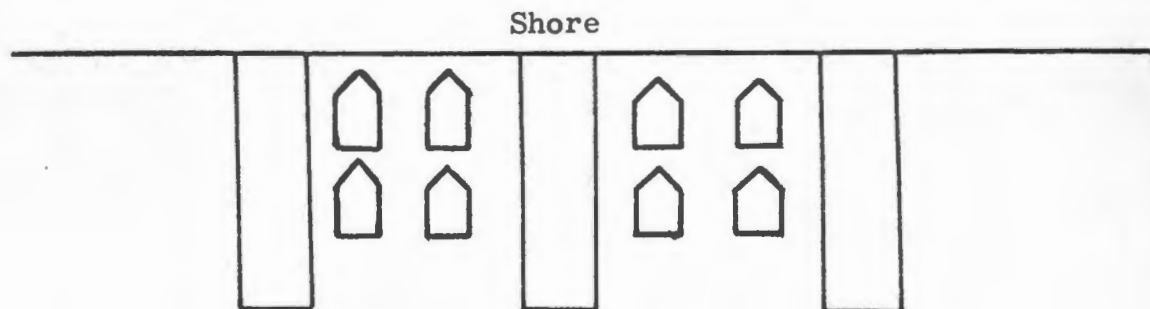


FIGURE VI

METHOD OF MOORING BOATS AT GALILEE, RHODE ISLAND

It is recommended that Figure V on page 44 be employed at Galilee for both pleasure and commercial craft, particularly for its efficient space utilization.

THE ENTRANCE TO A HARBOR OR BERTHING AREA SHOULD BE SO LOCATED AND WIDE ENOUGH TO PERMIT THE SPEEDY AND SAFE PASSAGE OF BOATS IN TIME OF STORMS, FIRE, OR OTHER EMERGENCY.

Navigational difficulties approaching the Galilee area are the result of increased boating traffic, tidal currents in the entrance channel through the breachway, inadequate depth in existing channels and anchorages, and insufficient mooring spaces. The tidal currents encountered in the approach to Galilee cause vessels to be drawn dangerously close to the edge of the channel.⁶³

⁶³United States Congress, House Committee on Public Works, Point Judith, Rhode Island, op. cit., p. 41.

The Army Corps of Engineers found the following navigational improvements needed and economically justified.

1. Deepen the existing entrance channel to Point Judith Pond and the east branch thereof from 15 to 20 feet.
2. Enlarge the existing inner harbor anchorage at Galilee from 5 to 11 acres with a depth of 10 feet.
3. Provide an 8 acre anchorage, 8 feet deep, south of Little Comfort Island.
4. Provide a channel 150 feet wide and 10 feet deep along the state finger piers to the Little Comfort anchorage.⁶⁴

Such improvements as recommended by the Army Corps of Engineers would reduce channel traffic hazards and anchorage congestion for existing and prospective recreational and commercial craft.⁶⁵ (See map on page 74)

The width of channels depends principally on the number and size of the vessels using the channel as stated in Chapter III. A minimum width of five times the beam (width) of the largest vessel should be considered.

Channel depth also depends on the size and type of vessel and the speed at which they would be traveling. Channel and anchorage depths are designed to accommodate the largest boats expected to use a water area.⁶⁶

⁶⁴Ibid.

⁶⁵Ibid., p. 39.

⁶⁶American Society of Civil Engineers, op. cit., p. 57.

It is evident from Table IV that the improvements for Galilee as suggested by the Corps of Engineers are also established as necessary by the American Society of Civil Engineers.

TABLE IV
MINIMUM BASIN DEPTHS

Location in Basin	Minimum Depth in Feet
Main Basin Channel	15
Access Slips	12
Berths*	8-12

NOTE: Source of data, American Society of Civil Engineers.
*Eight feet deep for boats 30 feet and less, deepened progressively to 12 feet for boats 65 feet long.

IN PLANNING FOR THE SAFETY OF MOORED CRAFT, PARTICULARLY SMALL RECREATIONAL CRAFT, BREAKWATERS OR FLOATING BAFFLES ARE GENERALLY NECESSARY TO PROTECT THESE CRAFT FROM ROUGH WATER DAMAGE.

The Galilee water area is a part of what is called Point Judith Pond. The pond is a fine natural harbor offering a great deal of protection for water craft. Storms and hurricanes of past years have done considerable damage to water craft, particularly small recreational craft, in spite of protections Galilee offers. The writer recommends the construction of breakwaters as explained on page 69 , for protection from natural waves and those caused by larger craft.



HARBOR AND CHANNEL IMPROVEMENTS RECOMMENDED BY
THE ARMY CORPS OF ENGINEERS

WATER RESOURCE PLANNING SHOULD INCLUDE ZONING
OF THESE WATER AREAS WITH RESPECT TO FUNCTION
SUCH AS COMMERCIAL OR RECREATIONAL BOATING.

Galilee has particular need for zoning because of competing users of water area and facilities. Water zoning may be of three types, namely, area, time and space. In area zoning various water areas are established for certain kinds of boating activity. Time zoning involves setting aside some portion of the day for one activity and a different portion for conflicting activity. Space zoning is designed to minimize the conflict between fast and slow boats by providing a barrier of space around the slow boats. A boat thus approaching a fisherman would be required to slow to a no-wake speed until it is the required distance away from the fisherman.⁶⁷

The writer feels area zoning is the greatest need in Galilee. Because of the vast water area available to the recreational boater in Salt Pond, the Harbor of Refuge, and the ocean, space and time zoning are not an immediate problem as they might be on a lake where water zoning is limited.

The schematic design on page 79 shows suggested water uses for Galilee. The commercial boat area is located close to both fish processing plants next to a party and charter boat area. A transient and recreational boat area is provided for next to the recreational boat area,

⁶⁷Stott, op. cit., p. 29.

just south of Little Comfort Island. The United States Coast Guard station, located in the second most southerly position, allows fast movement to the Harbor of Refuge or ocean with the least interference possible. The Block Island Ferry accommodations, south of and adjacent to the United States Coast Guard station, allow the ferry to enter and leave Galilee with a minimum of conflict with other craft in the area.

It must be stated that implementation of such water use patterns in Galilee would be expensive; yet it must be realized that due to the extensive deterioration of facilities in Galilee improvements are necessary.

IN PLANNING WATER RESOURCE AREAS FOR BOAT FACILITIES THE WATER AREA SHOULD BE COMPLEMENTED BY AT LEAST AS MUCH LAND.

Land equal to the water area used for boating facilities exists in Galilee, yet much of it is not directly related to boating. Many of the structures in Galilee are deteriorating and empty. Efficient utilization of the land requires that some of these buildings be removed. Galilee has a great potential as a boat harbor. Realization of such potential depends upon adherence to criteria developed in this and the counterpart to this thesis. The land adjacent to the water area must be developed so that harmony between the two may be achieved. Activities such as marine railways, roads and driveways, parking areas, service and sales should be located with respect to convenience and efficient utilization. In order that this may be achieved land facilities require as much space as the water area to be served.

IN PLANNING WATER RESOURCE AREAS MOORING AND BERTHING AREAS SHOULD BE SO LOCATED AS TO PERMIT QUICK EVACUATION IN CASE OF FIRE OR OTHER EMERGENCY.

Galilee is favored with a sufficient water area which allows evacuation of mooring areas quite efficiently. The proposed small recreational craft area south of Little Comfort Island is so located as to allow these craft to proceed either east to Bluff Hill Cove or west to the open waters of Point Judith Pond. All other berthing areas permit boats to proceed west to the same open waters of Point Judith Pond. Such evacuation can be realized if recommendations by the United States Army Corps of Engineers for channel and anchorage improvements are constructed. The writer previously stated that docks at Galilee are not sufficiently spaced. At present boat docking practices at Galilee do not permit quick evacuation of some boats. In order to proceed from the dock two boats may not be moored on each side and behind a boat, as insufficient space does not permit a boat to pass between two moored craft.

Galilee is further favorably located in that warnings of a hurricane would allow boat owners to proceed to upper Salt Pond in relatively short time where additional protection from the storm is available in sheltered coves.

IN PROVIDING FACILITIES ON WATER RESOURCE AREAS PLANNERS SHOULD ASSUME THAT FIFTY PER CENT OF THE PLEASURE CRAFT WILL BE LAUNCHED, HAULED, AND STORED BY THE INDIVIDUAL OWNERS.

While detailed statistics are not yet available for Galilee, one could find solace in the fact that so many boaters do not require permanent facilities. However, if more facilities at a reasonable cost were available, many boat owners might be enticed to use them. As stated, due to the absence of data for Galilee the writer has recommended that pleasure boat areas be planned for 60 per cent capacity and developed in stages as demand increases.

SCHEMATIC PLAN

-  Commercial
-  Industrial
-  Public
-  Harbor Master
-  Boat Launching
-  Parking
-  Pedestrian Mall
-  Breakwater
-  Alternate Breakwater

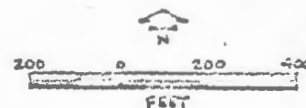
Sport Fishing Boats

Commercial Fishing Boats

U.S. Coast Guard

Ferry

Pleasure Boating

New Right
Of WaysDocks are
prototypes only

VI

SUMMARY AND CONCLUSIONS

In the preparation of this thesis the writer's desires were to develop criteria to reduce conflicts in areas where the land and water meet. Such criteria were developed and shown how they could be applied in Galilee, Rhode Island. It was found that if the criteria in this thesis were applied to Galilee, benefits to boaters, both commercial and recreational, would be realized.

Criteria developed and applied to Galilee could result in a much safer water area for its users. Segregated use areas could increase efficiency for the commercial fishing establishment and allow the recreational boat enthusiast to enjoy adequate facilities that presently do not exist.

At present there is a shortage of material available to guide planners in dealing with water-use and boating recreation. The writer feels that this thesis will contribute to an understanding of water resource planning by showing the mistakes that have been made as a water area developed, and ways of avoiding these same errors.

Considerable time was spent gathering material that would aid in planning water areas. It is felt this thesis will guide others to these

same sources and aid them in solving water resource planning problems as they may arise.

The criteria in this thesis will enable planners to approach a water area with an insight as to the needs and possible potential of that particular area. It is the writer's feeling that this thesis will help to determine the most appropriate use of water resources. It will also aid in determining ideal locations for recreational water facilities, obtaining maximum potential utilization of water resources that will result in safety and convenience to the public, and further expose the need for such planning. The criteria in this thesis aid in determining clearances necessary for boat maneuvering and berthing and sizes and capacities of berthing areas. In addition the planner will have an awareness of how wind, tides, currents, water depth, and littoral drift may influence his decision making.

Galilee's problems are mainly financial, and a Port Authority would probably solve such problems. The authority would establish rules and regulations for the safe and efficient operation of the area; fix standards of design, construction, safety and sanitation. The authority should be able to float bond issues for such needs that exist and pledge revenues of the port to pay these bonds.⁶⁸

One factor that cannot be neglected in Galilee is the need for current data on recreational boating. At present the size and number

⁶⁸United States Department of Commerce, Economic Development Administration, op. cit., pp. 14-15.

of recreational craft that use Galilee either seasonally or for short stays is not known. The writer recommends that a survey be conducted to ascertain such data in order that facilities may be provided with more accuracy.

There is every indication that the improvements recommended for Galilee are economically justified. The navigational improvements suggested by the Corps of Engineers have a benefit-cost ratio of 1.6 to 1.0.⁶⁹

Necessary facilities of the types recommended for Galilee are similar to those found in marinas in Rhode Island. Nothing has been suggested for Galilee that is not in present demand or has not been provided in other municipalities. Due to the fact that Galilee is partially a commercial fishing port the Federal Government would bear over 50 per cent of navigational improvements.

Criteria Summarized

When developing water areas, such as Galilee, Rhode Island, the primary reason for this development must be its function. Such functions are recreational area, commercial area, refuge area, convenience harbor, and transportation center.

The location of water resource areas to be planned should clearly relate to function. Location must consider the distance to fishing grounds for commercial fishermen, aesthetics particularly for recreational users, water quality for both commercial and recreational

⁶⁹United States Congress, House, Committee on Public Works, op. cit., p. 64.

users, and must be accessible by land and water.

Water site selection for boating facilities should be determined by the number and size of boats to be accommodated and should be accessible by land and water. Depth requirements increase as boat sizes increase. Channels should offer safe accessibility to facilities. Sufficient water area is necessary to avoid congestion.

Water resource space requirements for berthing and maneuvering should be determined by the number and size of boats to be accommodated. The demand for pleasure boat facilities increases 10 per cent per year. The present trend is towards larger craft. It is necessary to provide facilities for transients.

In accommodating trailered boats one launch lane should be provided for each forty boats using the facility. One facility per forty boats is adequate to prevent delays in launching. Launching facilities must be protected from wind and waves. Launching facilities should include a dock to aid in handling the craft.

In planning water resource areas there should be only one water-side access to recreational boating facilities. One access point aids in boat traffic control. Also, one access point is a security factor to aid in preventing vandalism.

In order to exercise control of marine traffic harbor master facilities should be so located as to be able to observe and regulate this traffic and also provide security for moored craft. Ideally the harbor

master must be able to observe craft both entering and leaving the harbor. Harbor master facilities should be readily available to boaters seeking information and berthing instructions.

In planning berthing areas, such as slips for boats of all types, clearances between opposite slips should be beyond the beam (width) and length of the boats. Inadequate clearances between slips can be a fire hazard should conditions require boats to be moved. Adequate clearances insure maximum convenience to boat operators.

The entrance to a harbor or berthing area should be so located and wide enough to permit the speedy and safe passage of boats in time of storms, fire or other emergency. Channel width should be five times the beam (width) of the largest boat expected to use the channel. Proper channel width will reduce the possibilities of boat collisions and congestion. Breakwaters and floating baffles will protect small craft from natural waves, waves from larger craft and floating debris. Breakwaters and floating baffles will create a buffer to separate recreational craft from other water uses such as the commercial fishing industry.

Water resource planning should include zoning of water areas with respect to function such as commercial or recreational boating. Space zoning is designed to minimize conflict between different types of water users. Time zoning involves allocating a portion of the day to different water users.

In planning water resource areas for boating facilities the water area should be complimented by at least as much land. An equal amount

of land is necessary to support water activities. An equal amount of land will increase harmony between land and water by providing adequate shore facilities.

In planning water resource areas mooring and berthing areas should be so located as to permit quick evacuation in case of fire or other emergency. Berthing areas should provide for convenient maneuvering space and should be accessible to open water areas.

In providing facilities on water resource areas planners should assume that 50 per cent of the pleasure craft will be launched, hauled and stored by the individual owners. It is not necessary to provide seasonal berthing facilities for all recreational craft in a particular area. It must be realized that adequate, economically priced facilities would attract persons who normally haul their craft out of the water after each use.

The writer in this thesis has tried to show the reason water use deserves equal concern and why zoning should also be a tool for water use planning.

The counterpart to this thesis, "A Study of Land Resources Used for Boating in Galilee, Rhode Island," has established criteria, which are summarized in Chapter IV, to reduce the problems as they pertain to land resource uses. These criteria if applied provide visual and physical access to the water, solve land use problems where land is associated

with boating functions and simplify the decision making process in determining facility needs.

Water and land uses may enjoy a degree of harmony provided certain factors are realized. Those factors are the criteria developed in this and the counterpart to this thesis. It is hoped that other planners may benefit from this research as the writer has in conducting the project.

BIBLIOGRAPHY

A. BOOKS

Brown, Joe and David G. Wright. Marinas--A Guide to Their Development for Park and Recreation Departments. West Virginia: American Institute of Park Executives, Inc., 1965.

Bruno, H. A. and Associates. Marina Operations and Service. New York: National Association of Engine and Boat Manufacturers, Inc., 1967.

Chaney, Charles A. Marinas--Recommendations for Design, Construction and Maintenance. New York: National Association of Engine and Boat Manufacturers, 1961.

B. PERIODICALS

American Society of Planning Officials. American Society of Planning Officials Planning Advisory Service, Information Report No. 147. Chicago: American Society of Planning Officials, June 1961.

Olko, Stephen M. "Marinas and Yacht Clubs--Planning and Financing," Civil Engineering, June 1965.

"Small Craft Harbors Development," Progress Report of the Task Committee on Small Craft Harbors, Committee on Ports and Harbors. Journal of the Waterways and Harbors Division, American Society of Civil Engineers, Vol. 90, No. WWD, August 1964.

C. STUDIES

Alexander, Lewis A. Narragansett Bay: A Marine Profile. Office of Naval Research, Geography Branch, 1965.

Chaney, Charles A. "Pollution and the Marina," Boating Facilities, Vol. 8. Chicago: Outboard Boating Club of America, March, 1967.

Department of the Army. Seminar on Coastal Small Craft Harbors.
Washington: Department of the Army, Office of the Chief
of Engineers, 1965.

Department of Commerce, Economic Development Administration.
A Survey to Determine The Feasibility of a Port Authority
For the Point Judith--Galilee Area of Rhode Island. New York:
Development Counsellors International, Ltd., 1965.

Department of Health, Education & Welfare. Environmental Health
Practices in Recreation Areas. Washington: Government
Printing Office, July 1966.

Department of the Interior, Bureau of Outdoor Recreation. Outdoor
Recreation Space Standards. Washington: Government Printing
Office, April 1967.

Department of the Interior, Bureau of Outdoor Recreation. Outdoor
Recreation Trends. Washington: Government Printing Office,
April 1967.

Hwa, Chao, Chu Teng-Kao and Hsu Zan-Ziang. Study of Harbor Design.
Vol. 1. Mississippi: War Department, Corps of Engineers,
United States Waterways Experiment Station, 1945.

Mack, Andrew R. Boat Handling Equipment in the Modern Marina.
New York: National Association of Engine and Boat Manufacturers,
Inc., June 1959.

North Kingstown Planning Commission. Wickford Harbor Study.
Rhode Island: Rhode Island Development Council, December,
1960.

Outboard Boating Club of America. Launching Ramps and Piers.
Chicago: Outboard Boating Club of America, n.d.

Radice Development Company. Planning Study--Jerry Brown Farm
Tract. New York: Radice Realty and Construction Corporation,
1967.

Rhode Island Development Council. Boating in Rhode Island. Rhode
Island: Rhode Island Development Council, n.d.

Seattle District, Corps of Engineers and Pacific Northwest Region, Bureau of Outdoor Recreation. Pleasure Boating Study. Washington: Seattle District Corps of Engineers and Pacific Northwest Region Bureau of Outdoor Recreation, 1967.

Sheaffer, John R. and Arthur J. Zeizel. The Water Resource in Northeastern Illinois: Planning Its Use, Technical Report No. 4. Chicago: Northeastern Illinois Planning Commission, 1936.

South Kingstown Waterfront Resources Committee. Point Judith Harbor--Proposed Navigation Improvements & Hurricane Protection. Rhode Island: South Kingstown Waterfront Resources Committee, 1958.

Stott, Charles C. Evaluating Water Based Recreation Facilities and Areas, Bulletin No. 70. Washington: National Recreation and Park Association, 1967.

United States Congress, House, Committee on Public Works. Point Judith Rhode Island. 87th Congress, Second Session. House Document No. 521, 1962. Washington: Government Printing Office, 1962.

Wilson, George T. Lake Zoning for Recreation, Bulletin No. 44. West Virginia: American Institute of Park Executives, December 1964.

Wisconsin Department of Resource Development. Small Craft Harbors--Wisconsin Development Series. Wisconsin: Department of Resource Development, 1965.

D. UNPUBLISHED MATERIAL

Ise, Henry. Chief, Division of Harbors and Rivers. Statement at Public Hearing held at the State House, December 4, 1963.

Martucci, Naninni G. Coastline and Oceanographic Zoning: Use of Marine Resources and Hydrospace. Master of Community Planning Thesis, University of Rhode Island, 1967.

E. PAMPHLETS

Charlestown Tourist Association. Charlestown, Rhode Island Welcomes You. Rhode Island: Charlestown Tourist Association.

National Fire Protection Association. Marinas and Boatyards 1966.
Massachusetts: National Fire Protection Association, 1966.

F. INTERVIEWS

Fish, John. Employee, Fish's Bait Shop, Point Judith, Rhode Island,
April 1963.

Sprague, Peter. Commercial Fisherman, Point Judith, Rhode Island
April 1968.

APPENDIX

RESPONDENTS TO LETTERS OF INQUIRY

Advisory Commission on Intergovernmental Relations
 American Boat Builders & Repairers Association, Inc.
 American Geophysical Union
 American Power Boat Association
 American Shore and Beach Preservation Association
 American Society of Civil Engineers
 American Society of Limnology and Oceanography, Inc.
 American Society of Sanitary Engineering
 American Resources Association
 Aquatic Research Institute
 Arkansas Game & Fish Commission
 Association of Conservation Engineers
 California Institute of Technology
 Carnegie--Mellon University
 Commonwealth of Massachusetts, Division of Marine Fisheries
 Community Development Foundation, Inc.
 Community Service, Inc.
 Congress of the United States, Committee on Appropriations
 Congress of the United States, Committee on Public Works
 Congress of the United States, Joint Committee on Atomic Energy
 County Planning Commission, Alameda, California
 Clemson University
 Cruising Club of America
 Department of Civil Engineering, Massachusetts Institute of Technology
 Department of Conservation, State of Michigan
 Department of Harbors & Watercraft, State of California
 Department of Public Works, State of Maryland
 Department of the Army Coastal Engineering Research Board
 Department of the Army Board of Engineers for Rivers & Harbors
 Department of the Army, New England Division
 Department of the Army, Seattle, Washington District
 Department of the Army, United States Army Environmental
 Hygiene Agency
 Department of the Army, Waterways Experiment Station
 Department of the Navy, Naval Facilities Engineering Command
 Farm Foundation
 Federal Power Commission
 Franklin Institute Research Laboratories
 General Services Administration, National Archives & Records Service

George Washington University
 Georgia Institute of Technology, School of Architecture
 Georgia Institute of Technology, Water Resources Center
 Gilmore, German & Milne, Naval Architects
 Great Lakes Commission
 Gulf Coast Research Laboratory
 Hawaii, Department of Transportation
 Hawaii, Division of Water and Land Development
 Hunter, Paul Robinson, FAIA Architect
 Indiana University, Water Resources Research Center
 Instrument Society of America
 International 5.5 Metre Class Association
 Interstate Advisory Committee on the Susquehanna River Basin
 Iowa Natural Resources Council
 Izaak Walton League of America
 Johns Hopkins University, Chesapeake Bay Institute
 Kansas State Park and Resources Authority
 League of Women Voters
 Louisiana Water Resources Research Institute
 Manufacturing Chemists Association
 Misener Marine Construction Inc.
 Mobil Oil Corporation
 National Association of Marinas and Marine Dealers
 National Council of Yacht Clubs
 National Fire Protection Association
 National Recreation and Park Association
 National Referral Center for Science & Technology, Library of Congress
 National Society of Professional Engineers
 New York State College of Agriculture
 North American Yacht Racing Union
 Office of the Governor, Oregon
 Oregon State University
 Outboard Boating Club of America
 Pacific Northwest River Basin Commission
 Parsons, Brinckerhoff, Quade & Douglas, Engineers
 Rocket Cruising Association
 Rosselle, Robert W., Consulting Engineer
 Resources for the Future, Inc.
 Schutte, Frederick A., Research Specialist
 State Water Quality Control Board, Atlanta Georgia
 Stevens Institute of Technology
 Travelers Research Center, Inc.
 Treasury Department, Bureau of Customs
 United States Department of Commerce, Economic Development
 Administration
 United States Department of the Interior, Federal Pollution
 Control Administration

United States Department of the Interior, Office of the Secretary
United States House of Representatives, Committee on Merchant
Marine & Fisheries
United States Naval Civil Engineering Laboratory
United States Power Squadrons, National Headquarters
United States Senate Committee on Appropriations
United States Committee on Interior & Insular Affairs
United States Committee on Public Works
University of California, Statewide Water Resources Center
University of Michigan, Great Lakes Research Division
University of Minnesota, Water Resources Research Center

Gentlemen:

I am in the beginning stages of writing my thesis in the Department of Community Planning at the University of Rhode Island and would greatly appreciate any information you might be able to provide related to my problem.

The title of my thesis is "A Study of Marine Resources Applied to Galilee, Rhode Island." The problem which I have chosen to investigate is the demand for boating and that this demand has resulted in conflicts in waterfront planning. Therefore, it is my intention to demonstrate by using Galilee as the problem area, that the demand and conflicts in the water-land relationship exist and that criteria can be developed, which if applied, would reduce these conflicts. Specifically, the criteria will relate to the type of boating facilities, extent and arrangement of these facilities, and water-area requirements.

Any information you may be able to give me would be greatly appreciated.

Sincerely yours

William R. Onosko
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Wakefield, Rhode Island